

Sample Identification

MW-4-031711

SB25934-03

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 14:33

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0	1	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
67-64-1	Acetone	BRL		µg/l	10.0	1	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	0.5	1	"	"	"	"	"	
71-43-2	Benzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	2.0	1	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	10.0	1	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	2.0	1	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	1.0	1	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	2.0	1	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	2.0	1	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0	1	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	0.5	1	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0	1	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	1.0	1	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	0.5	1	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
98-82-8	Isopropylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
99-87-6	4-Isopropyltoluene	BRL		µg/l	1.0	1	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	2.0	1	"	"	"	"	"	
91-20-3	Naphthalene	9.0		µg/l	1.0	1	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	1.0	1	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5	1	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0	1	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	1.0	1	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	2.0	1	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	1.0	1	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	2.0	1	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	10.0	1	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	20.0	1	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0	1	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	400	1	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	102			70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	98			70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	108			70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	114			70-130 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003	
C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	

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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

Unadjusted C11-C22 Aromatic Hydrocarbons	BRL	mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003
Total Petroleum Hydrocarbons	BRL	mg/l	0.1	1	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	BRL	mg/l	0.1	1	"	"	"	"	"

EPH Target PAH AnalytesPrepared by method SW846 3510C

91-20-3	Naphthalene	3.76	µg/l	1.00	1	"	"	"	"	"
91-57-6	2-Methylnaphthalene	BRL	µg/l	1.00	1	"	"	"	"	"
208-96-8	Acenaphthylene	BRL	µg/l	1.00	1	"	"	"	"	"
83-32-9	Acenaphthene	BRL	µg/l	1.00	1	"	"	"	"	"
86-73-7	Fluorene	BRL	µg/l	1.00	1	"	"	"	"	"
85-01-8	Phenanthrene	1.05	µg/l	1.00	1	"	"	"	"	"
120-12-7	Anthracene	BRL	µg/l	1.00	1	"	"	"	"	"
206-44-0	Fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
129-00-0	Pyrene	BRL	µg/l	1.00	1	"	"	"	"	"
56-55-3	Benzo (a) anthracene	BRL	µg/l	1.00	1	"	"	"	"	"
218-01-9	Chrysene	BRL	µg/l	1.00	1	"	"	"	"	"
205-99-2	Benzo (b) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
207-08-9	Benzo (k) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
50-32-8	Benzo (a) pyrene	BRL	µg/l	0.200	1	"	"	"	"	"
193-39-5	Indeno (1,2,3-cd) pyrene	BRL	µg/l	0.500	1	"	"	"	"	"
53-70-3	Dibenzo (a,h) anthracene	BRL	µg/l	0.500	1	"	"	"	"	"
191-24-2	Benzo (g,h,i) perylene	BRL	µg/l	1.00	1	"	"	"	"	"

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	74		40-140 %	"	"	"	"	"
84-15-1	Ortho-Terphenyl	62		40-140 %	"	"	"	"	"
321-60-8	2-Fluorobiphenyl	74		40-140 %	"	"	"	"	"

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MW-5-031711

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Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0	1	SW846 8260C	25-Mar-11	25-Mar-11	JLG	1105196	
67-64-1	Acetone	BRL		µg/l	10.0	1	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	0.5	1	"	"	"	"	"	
71-43-2	Benzene	3.0		µg/l	1.0	1	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	2.0	1	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	10.0	1	"	"	"	"	"	
104-51-8	n-Butylbenzene	1.6		µg/l	1.0	1	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	2.0	1	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	1.0	1	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	2.0	1	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	2.0	1	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0	1	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	0.5	1	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0	1	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	1.0	1	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	0.5	1	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
98-82-8	Isopropylbenzene	1.9		µg/l	1.0	1	"	"	"	"	"	

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Volatile Organic CompoundsVolatile Organic CompoundsPrepared by method SW846 5030 Water MS

99-87-6	4-Isopropyltoluene	BRL		µg/l	1.0	1	SW846 8260C	25-Mar-11	25-Mar-11	JLG	1105196	
1634-04-4	Methyl tert-butyl ether	1.6		µg/l	1.0	1	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	2.0	1	"	"	"	"	"	
91-20-3	Naphthalene	1.8		µg/l	1.0	1	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	1.0	1	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5	1	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0	1	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	1.0	1	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	2.0	1	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	1.0	1	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	2.0	1	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	10.0	1	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	20.0	1	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0	1	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	400	1	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	95			70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	101			70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	112			70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	103			70-130 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003	
C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

MW-5-031711

SB25934-04

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 13:33

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

Unadjusted C11-C22 Aromatic Hydrocarbons	BRL	mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003
Total Petroleum Hydrocarbons	BRL	mg/l	0.1	1	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	BRL	mg/l	0.1	1	"	"	"	"	"

EPH Target PAH AnalytesPrepared by method SW846 3510C

91-20-3	Naphthalene	BRL	µg/l	1.00	1	"	"	"	"	"
91-57-6	2-Methylnaphthalene	BRL	µg/l	1.00	1	"	"	"	"	"
208-96-8	Acenaphthylene	BRL	µg/l	1.00	1	"	"	"	"	"
83-32-9	Acenaphthene	12.1	µg/l	1.00	1	"	"	"	"	"
86-73-7	Fluorene	BRL	µg/l	1.00	1	"	"	"	"	"
85-01-8	Phenanthrene	BRL	µg/l	1.00	1	"	"	"	"	"
120-12-7	Anthracene	BRL	µg/l	1.00	1	"	"	"	"	"
206-44-0	Fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
129-00-0	Pyrene	BRL	µg/l	1.00	1	"	"	"	"	"
56-55-3	Benzo (a) anthracene	BRL	µg/l	1.00	1	"	"	"	"	"
218-01-9	Chrysene	BRL	µg/l	1.00	1	"	"	"	"	"
205-99-2	Benzo (b) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
207-08-9	Benzo (k) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
50-32-8	Benzo (a) pyrene	BRL	µg/l	0.200	1	"	"	"	"	"
193-39-5	Indeno (1,2,3-cd) pyrene	BRL	µg/l	0.500	1	"	"	"	"	"
53-70-3	Dibenzo (a,h) anthracene	BRL	µg/l	0.500	1	"	"	"	"	"
191-24-2	Benzo (g,h,i) perylene	BRL	µg/l	1.00	1	"	"	"	"	"

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	78		40-140 %	"	"	"	"	"
84-15-1	Ortho-Terphenyl	47		40-140 %	"	"	"	"	"
321-60-8	2-Fluorobiphenyl	57		40-140 %	"	"	"	"	"

Sample Identification

MW-6-031711

SB25934-05

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 09:03

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
Volatile Organic Compounds												
Prepared by method SW846 5030 Water MS												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	10.0	10	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
67-64-1	Acetone	BRL		µg/l	100	10	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	5.0	10	"	"	"	"	"	
71-43-2	Benzene	55.7		µg/l	10.0	10	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	10.0	10	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	5.0	10	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	10.0	10	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	20.0	10	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	100	10	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	20.0	10	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	10.0	10	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	20.0	10	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	10.0	10	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	20.0	10	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	10.0	10	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	10.0	10	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	20.0	10	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	5.0	10	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	5.0	10	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	10.0	10	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	20.0	10	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	10.0	10	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	10.0	10	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	10.0	10	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	10.0	10	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	10.0	10	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	10.0	10	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	10.0	10	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	10.0	10	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	10.0	10	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	5.0	10	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	5.0	10	"	"	"	"	"	
100-41-4	Ethylbenzene	174		µg/l	10.0	10	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	5.0	10	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	100	10	"	"	"	"	"	
98-82-8	Isopropylbenzene	56.0		µg/l	10.0	10	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

MW-6-031711

SB25934-05

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 09:03

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
Volatile Organic Compounds												
Prepared by method SW846 5030 Water MS												
99-87-6	4-Isopropyltoluene	BRL		µg/l	10.0	10	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	10.0	10	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	100	10	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	20.0	10	"	"	"	"	"	
91-20-3	Naphthalene	486		µg/l	10.0	10	"	"	"	"	"	
103-65-1	n-Propylbenzene	20.1		µg/l	10.0	10	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	10.0	10	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	10.0	10	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	5.0	10	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	10.0	10	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	10.0	10	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	10.0	10	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	10.0	10	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	10.0	10	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	10.0	10	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	10.0	10	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	69.7		µg/l	10.0	10	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	10.0	10	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	10.0	10	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	20.0	10	"	"	"	"	"	
95-47-6	o-Xylene	56.0		µg/l	10.0	10	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	20.0	10	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	10.0	10	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	10.0	10	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	10.0	10	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	10.0	10	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	100	10	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	200	10	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	50.0	10	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	4000	10	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	102			70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	102			70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	119			70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	119			70-130 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003	
C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
C11-C22 Aromatic Hydrocarbons	0.2		mg/l	0.1	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

MW-6-031711

SB25934-05

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 09:03

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

Unadjusted C11-C22 Aromatic Hydrocarbons	0.4	mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003
Total Petroleum Hydrocarbons	0.2	mg/l	0.1	1	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	0.4	mg/l	0.1	1	"	"	"	"	"

EPH Target PAH AnalytesPrepared by method SW846 3510C

91-20-3	Naphthalene	126	µg/l	1.00	1	"	"	"	"	"
91-57-6	2-Methylnaphthalene	11.1	µg/l	1.00	1	"	"	"	"	"
208-96-8	Acenaphthylene	BRL	µg/l	1.00	1	"	"	"	"	"
83-32-9	Acenaphthene	40.3	µg/l	1.00	1	"	"	"	"	"
86-73-7	Fluorene	7.09	µg/l	1.00	1	"	"	"	"	"
85-01-8	Phenanthrene	6.21	µg/l	1.00	1	"	"	"	"	"
120-12-7	Anthracene	1.17	µg/l	1.00	1	"	"	"	"	"
206-44-0	Fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
129-00-0	Pyrene	BRL	µg/l	1.00	1	"	"	"	"	"
56-55-3	Benzo (a) anthracene	BRL	µg/l	1.00	1	"	"	"	"	"
218-01-9	Chrysene	BRL	µg/l	1.00	1	"	"	"	"	"
205-99-2	Benzo (b) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
207-08-9	Benzo (k) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
50-32-8	Benzo (a) pyrene	BRL	µg/l	0.200	1	"	"	"	"	"
193-39-5	Indeno (1,2,3-cd) pyrene	BRL	µg/l	0.500	1	"	"	"	"	"
53-70-3	Dibenzo (a,h) anthracene	BRL	µg/l	0.500	1	"	"	"	"	"
191-24-2	Benzo (g,h,i) perylene	BRL	µg/l	1.00	1	"	"	"	"	"

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	70		40-140 %	"	"	"	"	"
84-15-1	Ortho-Terphenyl	53		40-140 %	"	"	"	"	"
321-60-8	2-Fluorobiphenyl	61		40-140 %	"	"	"	"	"

Sample Identification

MW-7-031711

SB25934-06

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 15:36

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
Volatile Organic Compounds												
Prepared by method SW846 5030 Water MS												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	50.0	50	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
67-64-1	Acetone	BRL		µg/l	500	50	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	25.0	50	"	"	"	"	"	
71-43-2	Benzene	373		µg/l	50.0	50	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	50.0	50	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	25.0	50	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	50.0	50	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	100	50	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	500	50	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	100	50	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	50.0	50	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	100	50	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	50.0	50	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	100	50	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	50.0	50	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	50.0	50	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	100	50	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	25.0	50	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	25.0	50	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	50.0	50	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	100	50	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	50.0	50	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	50.0	50	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	50.0	50	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	50.0	50	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	50.0	50	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	50.0	50	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	50.0	50	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	50.0	50	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	50.0	50	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	25.0	50	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	25.0	50	"	"	"	"	"	
100-41-4	Ethylbenzene	4,400		µg/l	50.0	50	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	25.0	50	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	500	50	"	"	"	"	"	
98-82-8	Isopropylbenzene	126		µg/l	50.0	50	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

MW-7-031711

SB25934-06

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 15:36

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
Volatile Organic Compounds												
Prepared by method SW846 5030 Water MS												
99-87-6	4-Isopropyltoluene	BRL		µg/l	50.0	50	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	50.0	50	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	500	50	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	100	50	"	"	"	"	"	
91-20-3	Naphthalene	4,820		µg/l	50.0	50	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	50.0	50	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	50.0	50	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	25.0	50	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	50.0	50	"	"	"	"	"	
108-88-3	Toluene	1,160		µg/l	50.0	50	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	50.0	50	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	50.0	50	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	50.0	50	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	50.0	50	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	50.0	50	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	50.0	50	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	488		µg/l	50.0	50	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	132		µg/l	50.0	50	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	50.0	50	"	"	"	"	"	
179601-23-1	m,p-Xylene	2,420		µg/l	100	50	"	"	"	"	"	
95-47-6	o-Xylene	1,470		µg/l	50.0	50	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	100	50	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	50.0	50	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	50.0	50	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	50.0	50	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	50.0	50	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	500	50	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	1000	50	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	250	50	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	20000	50	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	102			70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	102			70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	105			70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	109			70-130 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

C9-C18 Aliphatic Hydrocarbons	0.3			mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	25-Mar-11	MM	1105003	
C19-C36 Aliphatic Hydrocarbons	BRL			mg/l	0.1	1	"	"	"	"	"	
C11-C22 Aromatic Hydrocarbons	BRL			mg/l	1.2	10	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

MW-7-031711

SB25934-06

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 15:36

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic Ranges

GS1

Prepared by method SW846 3510C

Unadjusted C11-C22 Aromatic Hydrocarbons	3.0	mg/l	1.2	10	+MADEP EPH 5/2004 R	23-Mar-11	25-Mar-11	MM	1105003
Total Petroleum Hydrocarbons	1.4	mg/l	0.1	1	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	3.3	mg/l	0.1	1	"	"	"	"	"

EPH Target PAH Analytes

GS1

Prepared by method SW846 3510C

91-20-3	Naphthalene	1,740	µg/l	10.0	10	"	"	"	"	"
91-57-6	2-Methylnaphthalene	133	µg/l	10.0	10	"	"	"	"	"
208-96-8	Acenaphthylene	BRL	µg/l	10.0	10	"	"	"	"	"
83-32-9	Acenaphthene	26.5	µg/l	10.0	10	"	"	"	"	"
86-73-7	Fluorene	12.6	µg/l	10.0	10	"	"	"	"	"
85-01-8	Phenanthrene	19.8	µg/l	10.0	10	"	"	"	"	"
120-12-7	Anthracene	BRL	µg/l	10.0	10	"	"	"	"	"
206-44-0	Fluoranthene	BRL	µg/l	10.0	10	"	"	"	"	"
129-00-0	Pyrene	BRL	µg/l	10.0	10	"	"	"	"	"
56-55-3	Benzo (a) anthracene	BRL	µg/l	10.0	10	"	"	"	"	"
218-01-9	Chrysene	BRL	µg/l	10.0	10	"	"	"	"	"
205-99-2	Benzo (b) fluoranthene	BRL	µg/l	10.0	10	"	"	"	"	"
207-08-9	Benzo (k) fluoranthene	BRL	µg/l	10.0	10	"	"	"	"	"
50-32-8	Benzo (a) pyrene	BRL	µg/l	2.00	10	"	"	"	"	"
193-39-5	Indeno (1,2,3-cd) pyrene	BRL	µg/l	5.00	10	"	"	"	"	"
53-70-3	Dibenzo (a,h) anthracene	BRL	µg/l	5.00	10	"	"	"	"	"
191-24-2	Benzo (g,h,i) perylene	BRL	µg/l	10.0	10	"	"	"	"	"

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	73		40-140 %	"	"	"	"	"
84-15-1	Ortho-Terphenyl	60		40-140 %	"	"	"	"	"
321-60-8	2-Fluorobiphenyl	83		40-140 %	"	"	"	"	"

Sample Identification

MW-8-031711

SB25934-07

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 10:14

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0	1	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
67-64-1	Acetone	BRL		µg/l	10.0	1	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	0.5	1	"	"	"	"	"	
71-43-2	Benzene	20.3		µg/l	1.0	1	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	2.0	1	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	10.0	1	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	2.0	1	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	1.0	1	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	2.0	1	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	2.0	1	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0	1	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	0.5	1	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0	1	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	1.0	1	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
100-41-4	Ethylbenzene	6.4		µg/l	1.0	1	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	0.5	1	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
98-82-8	Isopropylbenzene	2.2		µg/l	1.0	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

MW-8-031711

SB25934-07

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 10:14

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Volatile Organic CompoundsVolatile Organic CompoundsPrepared by method SW846 5030 Water MS

99-87-6	4-Isopropyltoluene	BRL		µg/l	1.0	1	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	2.0	1	"	"	"	"	"	
91-20-3	Naphthalene	BRL		µg/l	1.0	1	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	1.0	1	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5	1	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0	1	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	1.0	1	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	2.0	1	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	1.0	1	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	2.0	1	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	10.0	1	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	20.0	1	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0	1	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	400	1	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	103			70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	98			70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	109			70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	110			70-130 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003	
C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

Page 26 of 52

Sample Identification

MW-8-031711

SB25934-07

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 10:14

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

Unadjusted C11-C22 Aromatic Hydrocarbons	BRL	mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003
Total Petroleum Hydrocarbons	BRL	mg/l	0.1	1	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	BRL	mg/l	0.1	1	"	"	"	"	"

EPH Target PAH AnalytesPrepared by method SW846 3510C

91-20-3	Naphthalene	1.37	µg/l	1.00	1	"	"	"	"	"
91-57-6	2-Methylnaphthalene	BRL	µg/l	1.00	1	"	"	"	"	"
208-96-8	Acenaphthylene	2.08	µg/l	1.00	1	"	"	"	"	"
83-32-9	Acenaphthene	6.22	µg/l	1.00	1	"	"	"	"	"
86-73-7	Fluorene	1.12	µg/l	1.00	1	"	"	"	"	"
85-01-8	Phenanthrene	BRL	µg/l	1.00	1	"	"	"	"	"
120-12-7	Anthracene	BRL	µg/l	1.00	1	"	"	"	"	"
206-44-0	Fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
129-00-0	Pyrene	BRL	µg/l	1.00	1	"	"	"	"	"
56-55-3	Benzo (a) anthracene	BRL	µg/l	1.00	1	"	"	"	"	"
218-01-9	Chrysene	BRL	µg/l	1.00	1	"	"	"	"	"
205-99-2	Benzo (b) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
207-08-9	Benzo (k) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
50-32-8	Benzo (a) pyrene	BRL	µg/l	0.200	1	"	"	"	"	"
193-39-5	Indeno (1,2,3-cd) pyrene	BRL	µg/l	0.500	1	"	"	"	"	"
53-70-3	Dibenzo (a,h) anthracene	BRL	µg/l	0.500	1	"	"	"	"	"
191-24-2	Benzo (g,h,i) perylene	BRL	µg/l	1.00	1	"	"	"	"	"

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	73		40-140 %	"	"	"	"	"
84-15-1	Ortho-Terphenyl	57		40-140 %	"	"	"	"	"
321-60-8	2-Fluorobiphenyl	71		40-140 %	"	"	"	"	"

Sample Identification

MW-9-031711

SB25934-08

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 16:46

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0	1	SW846 8260C	25-Mar-11	25-Mar-11	JLG	1105196	
67-64-1	Acetone	BRL		µg/l	10.0	1	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	0.5	1	"	"	"	"	"	
71-43-2	Benzene	16.9		µg/l	1.0	1	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	2.0	1	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	10.0	1	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	2.0	1	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	1.0	1	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	2.0	1	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	2.0	1	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0	1	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	0.5	1	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0	1	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	1.0	1	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	0.5	1	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
98-82-8	Isopropylbenzene	1.6		µg/l	1.0	1	"	"	"	"	"	

This laboratory report is not valid without an authorized signature on the cover page.

* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

MW-9-031711

SB25934-08

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 16:46

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Volatile Organic CompoundsVolatile Organic CompoundsPrepared by method SW846 5030 Water MS

99-87-6	4-Isopropyltoluene	BRL		µg/l	1.0	1	SW846 8260C	25-Mar-11	25-Mar-11	JLG	1105196	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	2.0	1	"	"	"	"	"	
91-20-3	Naphthalene	25.7		µg/l	1.0	1	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	1.0	1	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5	1	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0	1	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	1.2		µg/l	1.0	1	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	1.0	1	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	2.0	1	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	1.0	1	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	2.0	1	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	10.0	1	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	20.0	1	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0	1	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	400	1	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	95			70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	99			70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	110			70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	100			70-130 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003	
C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
C11-C22 Aromatic Hydrocarbons	0.2		mg/l	0.1	1	"	"	"	"	"	

This laboratory report is not valid without an authorized signature on the cover page.

* Reportable Detection Limit

BRL = Below Reporting Limit

Page 29 of 52

Sample Identification

MW-9-031711

SB25934-08

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 16:46

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

Unadjusted C11-C22 Aromatic Hydrocarbons	0.3	mg/l	0.1	1	+MADEP EPH 5/2004 R	23-Mar-11	24-Mar-11	MM	1105003
Total Petroleum Hydrocarbons	0.2	mg/l	0.1	1	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	0.3	mg/l	0.1	1	"	"	"	"	"

EPH Target PAH AnalytesPrepared by method SW846 3510C

91-20-3	Naphthalene	6.44	µg/l	1.00	1	"	"	"	"	"
91-57-6	2-Methylnaphthalene	2.12	µg/l	1.00	1	"	"	"	"	"
208-96-8	Acenaphthylene	BRL	µg/l	1.00	1	"	"	"	"	"
83-32-9	Acenaphthene	26.3	µg/l	1.00	1	"	"	"	"	"
86-73-7	Fluorene	24.5	µg/l	1.00	1	"	"	"	"	"
85-01-8	Phenanthrene	22.0	µg/l	1.00	1	"	"	"	"	"
120-12-7	Anthracene	6.91	µg/l	1.00	1	"	"	"	"	"
206-44-0	Fluoranthene	8.98	µg/l	1.00	1	"	"	"	"	"
129-00-0	Pyrene	6.47	µg/l	1.00	1	"	"	"	"	"
56-55-3	Benzo (a) anthracene	1.05	µg/l	1.00	1	"	"	"	"	"
218-01-9	Chrysene	2.56	µg/l	1.00	1	"	"	"	"	"
205-99-2	Benzo (b) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
207-08-9	Benzo (k) fluoranthene	BRL	µg/l	1.00	1	"	"	"	"	"
50-32-8	Benzo (a) pyrene	BRL	µg/l	0.200	1	"	"	"	"	"
193-39-5	Indeno (1,2,3-cd) pyrene	BRL	µg/l	0.500	1	"	"	"	"	"
53-70-3	Dibenzo (a,h) anthracene	BRL	µg/l	0.500	1	"	"	"	"	"
191-24-2	Benzo (g,h,i) perylene	BRL	µg/l	1.00	1	"	"	"	"	"

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	67		40-140 %	"	"	"	"	"
84-15-1	Ortho-Terphenyl	59		40-140 %	"	"	"	"	"
321-60-8	2-Fluorobiphenyl	71		40-140 %	"	"	"	"	"

Sample Identification

FD-1-031711

SB25934-09

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 14:03

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0	1	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
67-64-1	Acetone	BRL		µg/l	10.0	1	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	0.5	1	"	"	"	"	"	
71-43-2	Benzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	2.0	1	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	10.0	1	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	2.0	1	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	1.0	1	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	2.0	1	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	2.0	1	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0	1	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	0.5	1	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0	1	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	1.0	1	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	0.5	1	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
98-82-8	Isopropylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

FD-1-031711

SB25934-09

Client Project #

11-1395

Matrix

Ground Water

Collection Date/Time

17-Mar-11 14:03

Received

18-Mar-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
99-87-6	4-Isopropyltoluene	BRL		µg/l	1.0	1	SW846 8260C	24-Mar-11	24-Mar-11	eq	1105106	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	2.0	1	"	"	"	"	"	
91-20-3	Naphthalene	9.8		µg/l	1.0	1	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	1.0	1	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5	1	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0	1	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	1.0	1	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	2.0	1	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	1.0	1	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	2.0	1	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	10.0	1	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	20.0	1	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0	1	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	400	1	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	102			70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	96			70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	105			70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	110			70-130 %		"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
Blank (1105106-BLK1)	Prepared & Analyzed: 24-Mar-11									
1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0						
Acetone	BRL		µg/l	10.0						
Acrylonitrile	BRL		µg/l	0.5						
Benzene	BRL		µg/l	1.0						
Bromobenzene	BRL		µg/l	1.0						
Bromochloromethane	BRL		µg/l	1.0						
Bromodichloromethane	BRL		µg/l	0.5						
Bromoform	BRL		µg/l	1.0						
Bromomethane	BRL		µg/l	2.0						
2-Butanone (MEK)	BRL		µg/l	10.0						
n-Butylbenzene	BRL		µg/l	1.0						
sec-Butylbenzene	BRL		µg/l	1.0						
tert-Butylbenzene	BRL		µg/l	1.0						
Carbon disulfide	BRL		µg/l	2.0						
Carbon tetrachloride	BRL		µg/l	1.0						
Chlorobenzene	BRL		µg/l	1.0						
Chloroethane	BRL		µg/l	2.0						
Chloroform	BRL		µg/l	1.0						
Chloromethane	BRL		µg/l	2.0						
2-Chlorotoluene	BRL		µg/l	1.0						
4-Chlorotoluene	BRL		µg/l	1.0						
1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0						
Dibromochloromethane	BRL		µg/l	0.5						
1,2-Dibromoethane (EDB)	BRL		µg/l	0.5						
Dibromomethane	BRL		µg/l	1.0						
1,2-Dichlorobenzene	BRL		µg/l	1.0						
1,3-Dichlorobenzene	BRL		µg/l	1.0						
1,4-Dichlorobenzene	BRL		µg/l	1.0						
Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0						
1,1-Dichloroethane	BRL		µg/l	1.0						
1,2-Dichloroethane	BRL		µg/l	1.0						
1,1-Dichloroethene	BRL		µg/l	1.0						
cis-1,2-Dichloroethene	BRL		µg/l	1.0						
trans-1,2-Dichloroethene	BRL		µg/l	1.0						
1,2-Dichloropropane	BRL		µg/l	1.0						
1,3-Dichloropropane	BRL		µg/l	1.0						
2,2-Dichloropropane	BRL		µg/l	1.0						
1,1-Dichloropropene	BRL		µg/l	1.0						
cis-1,3-Dichloropropene	BRL		µg/l	0.5						
trans-1,3-Dichloropropene	BRL		µg/l	0.5						
Ethylbenzene	BRL		µg/l	1.0						
Hexachlorobutadiene	BRL		µg/l	0.5						
2-Hexanone (MBK)	BRL		µg/l	10.0						
Isopropylbenzene	BRL		µg/l	1.0						
4-Isopropyltoluene	BRL		µg/l	1.0						
Methyl tert-butyl ether	BRL		µg/l	1.0						
4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0						
Methylene chloride	BRL		µg/l	2.0						
Naphthalene	BRL		µg/l	1.0						
n-Propylbenzene	BRL		µg/l	1.0						
Styrene	BRL		µg/l	1.0						
1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0						

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
Blank (1105106-BLK1)					<u>Prepared & Analyzed: 24-Mar-11</u>					
1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5						
Tetrachloroethene	BRL		µg/l	1.0						
Toluene	BRL		µg/l	1.0						
1,2,3-Trichlorobenzene	BRL		µg/l	1.0						
1,2,4-Trichlorobenzene	BRL		µg/l	1.0						
1,3,5-Trichlorobenzene	BRL		µg/l	1.0						
1,1,1-Trichloroethane	BRL		µg/l	1.0						
1,1,2-Trichloroethane	BRL		µg/l	1.0						
Trichloroethene	BRL		µg/l	1.0						
Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0						
1,2,3-Trichloropropane	BRL		µg/l	1.0						
1,2,4-Trimethylbenzene	BRL		µg/l	1.0						
1,3,5-Trimethylbenzene	BRL		µg/l	1.0						
Vinyl chloride	BRL		µg/l	1.0						
m,p-Xylene	BRL		µg/l	2.0						
o-Xylene	BRL		µg/l	1.0						
Tetrahydrofuran	BRL		µg/l	2.0						
Ethyl ether	BRL		µg/l	1.0						
Tert-amyl methyl ether	BRL		µg/l	1.0						
Ethyl tert-butyl ether	BRL		µg/l	1.0						
Di-isopropyl ether	BRL		µg/l	1.0						
Tert-Butanol / butyl alcohol	BRL		µg/l	10.0						
1,4-Dioxane	BRL		µg/l	20.0						
trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0						
Ethanol	BRL		µg/l	400						
<i>Surrogate: 4-Bromofluorobenzene</i>	29.9		µg/l		30.0		100	70-130		
<i>Surrogate: Toluene-d8</i>	29.5		µg/l		30.0		98	70-130		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	34.1		µg/l		30.0		114	70-130		
<i>Surrogate: Dibromofluoromethane</i>	33.5		µg/l		30.0		112	70-130		
LCS (1105106-BS1)					<u>Prepared & Analyzed: 24-Mar-11</u>					
1,1,2-Trichlorotrifluoroethane (Freon 113)	25.2		µg/l		20.0		126	70-130		
Acetone	27.0		µg/l		20.0		135	70-130		
Acrylonitrile	25.3		µg/l		20.0		126	70-130		
Benzene	20.2		µg/l		20.0		101	70-130		
Bromobenzene	19.8		µg/l		20.0		99	70-130		
Bromochloromethane	23.1		µg/l		20.0		116	70-130		
Bromodichloromethane	21.9		µg/l		20.0		109	70-130		
Bromoform	19.8		µg/l		20.0		99	70-130		
Bromomethane	27.2		µg/l		20.0		136	70-130		
2-Butanone (MEK)	24.5		µg/l		20.0		122	70-130		
n-Butylbenzene	20.9		µg/l		20.0		104	70-130		
sec-Butylbenzene	20.2		µg/l		20.0		101	70-130		
tert-Butylbenzene	20.6		µg/l		20.0		103	70-130		
Carbon disulfide	23.9		µg/l		20.0		119	70-130		
Carbon tetrachloride	18.6		µg/l		20.0		93	70-130		
Chlorobenzene	19.9		µg/l		20.0		100	70-130		
Chloroethane	23.1		µg/l		20.0		115	70-130		
Chloroform	23.4		µg/l		20.0		117	70-130		
Chloromethane	22.6		µg/l		20.0		113	70-130		
2-Chlorotoluene	20.3		µg/l		20.0		101	70-130		
4-Chlorotoluene	20.1		µg/l		20.0		100	70-130		

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* Reportable Detection Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
<u>LCS (1105106-BS1)</u>	<u>Prepared & Analyzed: 24-Mar-11</u>									
1,2-Dibromo-3-chloropropane	18.1		µg/l		20.0		90	70-130		
Dibromochloromethane	20.9		µg/l		20.0		105	70-130		
1,2-Dibromoethane (EDB)	21.2		µg/l		20.0		106	70-130		
Dibromomethane	22.8		µg/l		20.0		114	70-130		
1,2-Dichlorobenzene	20.0		µg/l		20.0		100	70-130		
1,3-Dichlorobenzene	19.6		µg/l		20.0		98	70-130		
1,4-Dichlorobenzene	19.4		µg/l		20.0		97	70-130		
Dichlorodifluoromethane (Freon12)	24.4		µg/l		20.0		122	70-130		
1,1-Dichloroethane	24.1		µg/l		20.0		121	70-130		
1,2-Dichloroethane	23.2		µg/l		20.0		116	70-130		
1,1-Dichloroethene	23.7		µg/l		20.0		119	70-130		
cis-1,2-Dichloroethene	23.9		µg/l		20.0		120	70-130		
trans-1,2-Dichloroethene	23.6		µg/l		20.0		118	70-130		
1,2-Dichloropropane	20.9		µg/l		20.0		104	70-130		
1,3-Dichloropropane	21.2		µg/l		20.0		106	70-130		
2,2-Dichloropropane	17.3		µg/l		20.0		87	70-130		
1,1-Dichloropropene	21.4		µg/l		20.0		107	70-130		
cis-1,3-Dichloropropene	18.7		µg/l		20.0		94	70-130		
trans-1,3-Dichloropropene	17.4		µg/l		20.0		87	70-130		
Ethylbenzene	20.4		µg/l		20.0		102	70-130		
Hexachlorobutadiene	19.7		µg/l		20.0		99	70-130		
2-Hexanone (MBK)	21.3		µg/l		20.0		107	70-130		
Isopropylbenzene	20.3		µg/l		20.0		102	70-130		
4-Isopropyltoluene	21.1		µg/l		20.0		105	70-130		
Methyl tert-butyl ether	24.5		µg/l		20.0		122	70-130		
4-Methyl-2-pentanone (MIBK)	22.7		µg/l		20.0		114	70-130		
Methylene chloride	21.7		µg/l		20.0		109	70-130		
Naphthalene	21.8		µg/l		20.0		109	70-130		
n-Propylbenzene	20.6		µg/l		20.0		103	70-130		
Styrene	18.6		µg/l		20.0		93	70-130		
1,1,1,2-Tetrachloroethane	18.0		µg/l		20.0		90	70-130		
1,1,2,2-Tetrachloroethane	21.9		µg/l		20.0		109	70-130		
Tetrachloroethene	20.8		µg/l		20.0		104	70-130		
Toluene	20.4		µg/l		20.0		102	70-130		
1,2,3-Trichlorobenzene	21.0		µg/l		20.0		105	70-130		
1,2,4-Trichlorobenzene	20.3		µg/l		20.0		101	70-130		
1,3,5-Trichlorobenzene	19.8		µg/l		20.0		99	70-130		
1,1,1-Trichloroethane	21.1		µg/l		20.0		106	70-130		
1,1,2-Trichloroethane	21.3		µg/l		20.0		107	70-130		
Trichloroethene	21.5		µg/l		20.0		107	70-130		
Trichlorofluoromethane (Freon 11)	26.0		µg/l		20.0		130	70-130		
1,2,3-Trichloropropane	21.6		µg/l		20.0		108	70-130		
1,2,4-Trimethylbenzene	21.4		µg/l		20.0		107	70-130		
1,3,5-Trimethylbenzene	20.9		µg/l		20.0		104	70-130		
Vinyl chloride	25.7		µg/l		20.0		128	70-130		
m,p-Xylene	39.3		µg/l		40.0		98	70-130		
o-Xylene	19.6		µg/l		20.0		98	70-130		
Tetrahydrofuran	20.9		µg/l		20.0		105	70-130		
Ethyl ether	22.3		µg/l		20.0		112	70-130		
Tert-amyl methyl ether	19.6		µg/l		20.0		98	70-130		
Ethyl tert-butyl ether	22.7		µg/l		20.0		114	70-130		
Di-isopropyl ether	24.4		µg/l		20.0		122	70-130		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
<u>LCS (1105106-BS1)</u>					<u>Prepared & Analyzed: 24-Mar-11</u>					
Tert-Butanol / butyl alcohol	211		µg/l		200		106	70-130		
1,4-Dioxane	201		µg/l		200		100	70-130		
trans-1,4-Dichloro-2-butene	17.4		µg/l		20.0		87	70-130		
Ethanol	472		µg/l		400		118	70-130		
Surrogate: 4-Bromofluorobenzene	30.2		µg/l		30.0		101	70-130		
Surrogate: Toluene-d8	30.3		µg/l		30.0		101	70-130		
Surrogate: 1,2-Dichloroethane-d4	34.7		µg/l		30.0		116	70-130		
Surrogate: Dibromofluoromethane	35.3		µg/l		30.0		118	70-130		
<u>LCS Dup (1105106-BSD1)</u>					<u>Prepared & Analyzed: 24-Mar-11</u>					
1,1,2-Trichlorotrifluoroethane (Freon 113)	24.2		µg/l		20.0		121	70-130	4	25
Acetone	26.0		µg/l		20.0		130	70-130	4	50
Acrylonitrile	24.9		µg/l		20.0		125	70-130	1	25
Benzene	20.5		µg/l		20.0		102	70-130	2	25
Bromobenzene	20.1		µg/l		20.0		100	70-130	2	25
Bromochloromethane	23.2		µg/l		20.0		116	70-130	0.5	25
Bromodichloromethane	23.6		µg/l		20.0		118	70-130	8	25
Bromoform	22.5		µg/l		20.0		113	70-130	13	25
Bromomethane	28.2		µg/l		20.0		141	70-130	4	50
2-Butanone (MEK)	27.1		µg/l		20.0		136	70-130	10	50
n-Butylbenzene	19.8		µg/l		20.0		99	70-130	5	25
sec-Butylbenzene	20.5		µg/l		20.0		103	70-130	1	25
tert-Butylbenzene	21.1		µg/l		20.0		105	70-130	2	25
Carbon disulfide	23.6		µg/l		20.0		118	70-130	1	25
Carbon tetrachloride	18.7		µg/l		20.0		94	70-130	0.6	25
Chlorobenzene	20.3		µg/l		20.0		101	70-130	2	25
Chloroethane	22.7		µg/l		20.0		113	70-130	2	50
Chloroform	23.4		µg/l		20.0		117	70-130	0	25
Chloromethane	21.6		µg/l		20.0		108	70-130	4	25
2-Chlorotoluene	21.2		µg/l		20.0		106	70-130	5	25
4-Chlorotoluene	20.6		µg/l		20.0		103	70-130	3	25
1,2-Dibromo-3-chloropropane	17.4		µg/l		20.0		87	70-130	4	25
Dibromochloromethane	20.4		µg/l		20.0		102	70-130	2	50
1,2-Dibromoethane (EDB)	21.2		µg/l		20.0		106	70-130	0.1	25
Dibromomethane	22.9		µg/l		20.0		114	70-130	0.3	25
1,2-Dichlorobenzene	19.5		µg/l		20.0		98	70-130	2	25
1,3-Dichlorobenzene	21.0		µg/l		20.0		105	70-130	7	25
1,4-Dichlorobenzene	19.2		µg/l		20.0		96	70-130	1	25
Dichlorodifluoromethane (Freon12)	23.1		µg/l		20.0		116	70-130	5	50
1,1-Dichloroethane	23.2		µg/l		20.0		116	70-130	4	25
1,2-Dichloroethane	22.8		µg/l		20.0		114	70-130	1	25
1,1-Dichloroethene	23.3		µg/l		20.0		116	70-130	2	25
cis-1,2-Dichloroethene	23.0		µg/l		20.0		115	70-130	4	25
trans-1,2-Dichloroethene	24.0		µg/l		20.0		120	70-130	2	25
1,2-Dichloropropane	20.4		µg/l		20.0		102	70-130	2	25
1,3-Dichloropropane	21.9		µg/l		20.0		109	70-130	3	25
2,2-Dichloropropane	17.0		µg/l		20.0		85	70-130	2	25
1,1-Dichloropropene	21.5		µg/l		20.0		108	70-130	0.7	25
cis-1,3-Dichloropropene	18.8		µg/l		20.0		94	70-130	0.5	25
trans-1,3-Dichloropropene	17.4		µg/l		20.0		87	70-130	0.06	25
Ethylbenzene	20.9		µg/l		20.0		104	70-130	2	25
Hexachlorobutadiene	19.7		µg/l		20.0		99	70-130	0	50

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
<u>LCS Dup (1105106-BSD1)</u>					<u>Prepared & Analyzed: 24-Mar-11</u>					
2-Hexanone (MBK)	21.7		µg/l		20.0		109	70-130	2	25
Isopropylbenzene	20.7		µg/l		20.0		103	70-130	2	25
4-Isopropyltoluene	19.9		µg/l		20.0		100	70-130	6	25
Methyl tert-butyl ether	24.4		µg/l		20.0		122	70-130	0.4	25
4-Methyl-2-pentanone (MIBK)	22.1		µg/l		20.0		111	70-130	3	50
Methylene chloride	22.6		µg/l		20.0		113	70-130	4	25
Naphthalene	22.6		µg/l		20.0		113	70-130	3	25
n-Propylbenzene	21.0		µg/l		20.0		105	70-130	2	25
Styrene	20.5		µg/l		20.0		103	70-130	10	25
1,1,1,2-Tetrachloroethane	19.2		µg/l		20.0		96	70-130	6	25
1,1,2,2-Tetrachloroethane	23.4		µg/l		20.0		117	70-130	7	25
Tetrachloroethene	20.5		µg/l		20.0		103	70-130	1	25
Toluene	19.9		µg/l		20.0		100	70-130	3	25
1,2,3-Trichlorobenzene	21.1		µg/l		20.0		105	70-130	0.3	25
1,2,4-Trichlorobenzene	20.5		µg/l		20.0		103	70-130	1	25
1,3,5-Trichlorobenzene	18.5		µg/l		20.0		92	70-130	7	25
1,1,1-Trichloroethane	20.0		µg/l		20.0		100	70-130	6	25
1,1,2-Trichloroethane	21.9		µg/l		20.0		109	70-130	2	25
Trichloroethene	20.8		µg/l		20.0		104	70-130	3	25
Trichlorofluoromethane (Freon 11)	25.2		µg/l		20.0		126	70-130	3	50
1,2,3-Trichloropropane	22.1		µg/l		20.0		111	70-130	3	25
1,2,4-Trimethylbenzene	21.4		µg/l		20.0		107	70-130	0	25
1,3,5-Trimethylbenzene	20.9		µg/l		20.0		104	70-130	0.2	25
Vinyl chloride	26.0		µg/l		20.0		130	70-130	1	25
m,p-Xylene	40.3		µg/l		40.0		101	70-130	3	25
o-Xylene	20.8		µg/l		20.0		104	70-130	6	25
Tetrahydrofuran	21.6		µg/l		20.0		108	70-130	3	25
Ethyl ether	22.8		µg/l		20.0		114	70-130	2	50
Tert-amyl methyl ether	19.7		µg/l		20.0		98	70-130	0.6	25
Ethyl tert-butyl ether	23.0		µg/l		20.0		115	70-130	1	25
Di-isopropyl ether	24.7		µg/l		20.0		124	70-130	1	25
Tert-Butanol / butyl alcohol	216		µg/l		200		108	70-130	2	25
1,4-Dioxane	199		µg/l		200		99	70-130	1	25
trans-1,4-Dichloro-2-butene	19.8		µg/l		20.0		99	70-130	13	25
Ethanol	520		µg/l		400		130	70-130	10	30
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Surrogate: 4-Bromofluorobenzene	30.2		µg/l		30.0		101	70-130		
Surrogate: Toluene-d8	29.9		µg/l		30.0		100	70-130		
Surrogate: 1,2-Dichloroethane-d4	34.4		µg/l		30.0		115	70-130		
Surrogate: Dibromofluoromethane	36.8		µg/l		30.0		123	70-130		
<u>Matrix Spike (1105106-MS1)</u>					<u>Source: SB25934-03</u>		<u>Prepared & Analyzed: 24-Mar-11</u>			
1,1,2-Trichlorotrifluoroethane (Freon 113)	15.0		µg/l		20.0	BRL	75	70-130		
Acetone	55.7	QM7	µg/l		20.0	BRL	279	70-130		
Acrylonitrile	27.8	QM7	µg/l		20.0	BRL	139	70-130		
Benzene	18.5		µg/l		20.0	BRL	93	70-130		
Bromobenzene	21.6		µg/l		20.0	BRL	108	70-130		
Bromochloromethane	23.1		µg/l		20.0	BRL	115	70-130		
Bromodichloromethane	23.5		µg/l		20.0	BRL	118	70-130		
Bromoform	20.0		µg/l		20.0	BRL	100	70-130		
Bromomethane	16.7		µg/l		20.0	BRL	84	70-130		
2-Butanone (MEK)	24.7		µg/l		20.0	BRL	124	70-130		
n-Butylbenzene	19.6		µg/l		20.0	BRL	98	70-130		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
<u>Matrix Spike (1105106-MS1)</u>				<u>Source: SB25934-03</u>				<u>Prepared & Analyzed: 24-Mar-11</u>		
sec-Butylbenzene	18.4		µg/l		20.0	BRL	92	70-130		
tert-Butylbenzene	19.3		µg/l		20.0	BRL	97	70-130		
Carbon disulfide	8.5	QM7	µg/l		20.0	BRL	43	70-130		
Carbon tetrachloride	13.1	QM7	µg/l		20.0	BRL	66	70-130		
Chlorobenzene	19.6		µg/l		20.0	BRL	98	70-130		
Chloroethane	17.5		µg/l		20.0	BRL	88	70-130		
Chloroform	22.6		µg/l		20.0	BRL	113	70-130		
Chloromethane	11.5	QM7	µg/l		20.0	BRL	58	70-130		
2-Chlorotoluene	20.2		µg/l		20.0	BRL	101	70-130		
4-Chlorotoluene	20.5		µg/l		20.0	BRL	102	70-130		
1,2-Dibromo-3-chloropropane	14.0		µg/l		20.0	BRL	70	70-130		
Dibromochloromethane	20.4		µg/l		20.0	BRL	102	70-130		
1,2-Dibromoethane (EDB)	21.5		µg/l		20.0	BRL	107	70-130		
Dibromomethane	23.5		µg/l		20.0	BRL	118	70-130		
1,2-Dichlorobenzene	20.6		µg/l		20.0	BRL	103	70-130		
1,3-Dichlorobenzene	20.8		µg/l		20.0	BRL	104	70-130		
1,4-Dichlorobenzene	20.0		µg/l		20.0	BRL	100	70-130		
Dichlorodifluoromethane (Freon12)	12.0	QM7	µg/l		20.0	BRL	60	70-130		
1,1-Dichloroethane	22.6		µg/l		20.0	BRL	113	70-130		
1,2-Dichloroethane	22.6		µg/l		20.0	BRL	113	70-130		
1,1-Dichloroethene	16.1		µg/l		20.0	BRL	80	70-130		
cis-1,2-Dichloroethene	22.3		µg/l		20.0	BRL	112	70-130		
trans-1,2-Dichloroethene	18.0		µg/l		20.0	BRL	90	70-130		
1,2-Dichloropropane	21.3		µg/l		20.0	BRL	106	70-130		
1,3-Dichloropropane	23.3		µg/l		20.0	BRL	116	70-130		
2,2-Dichloropropane	15.2		µg/l		20.0	BRL	76	70-130		
1,1-Dichloropropene	16.0		µg/l		20.0	BRL	80	70-130		
cis-1,3-Dichloropropene	19.2		µg/l		20.0	BRL	96	70-130		
trans-1,3-Dichloropropene	17.2		µg/l		20.0	BRL	86	70-130		
Ethylbenzene	18.4		µg/l		20.0	BRL	92	70-130		
Hexachlorobutadiene	20.9		µg/l		20.0	BRL	105	70-130		
2-Hexanone (MBK)	24.9		µg/l		20.0	BRL	125	70-130		
Isopropylbenzene	18.1		µg/l		20.0	BRL	90	70-130		
4-Isopropyltoluene	18.9		µg/l		20.0	BRL	94	70-130		
Methyl tert-butyl ether	25.4		µg/l		20.0	BRL	127	70-130		
4-Methyl-2-pentanone (MIBK)	27.2	QM7	µg/l		20.0	BRL	136	70-130		
Methylene chloride	21.4		µg/l		20.0	BRL	107	70-130		
Naphthalene	36.2	QM7	µg/l		20.0	9.0	136	70-130		
n-Propylbenzene	19.3		µg/l		20.0	BRL	96	70-130		
Styrene	20.2		µg/l		20.0	BRL	101	70-130		
1,1,1,2-Tetrachloroethane	17.1		µg/l		20.0	BRL	86	70-130		
1,1,2,2-Tetrachloroethane	23.1		µg/l		20.0	BRL	116	70-130		
Tetrachloroethene	17.7		µg/l		20.0	BRL	88	70-130		
Toluene	19.0		µg/l		20.0	BRL	95	70-130		
1,2,3-Trichlorobenzene	23.0		µg/l		20.0	BRL	115	70-130		
1,2,4-Trichlorobenzene	23.4		µg/l		20.0	BRL	117	70-130		
1,3,5-Trichlorobenzene	20.8		µg/l		20.0	BRL	104	70-130		
1,1,1-Trichloroethane	16.2		µg/l		20.0	BRL	81	70-130		
1,1,2-Trichloroethane	23.5		µg/l		20.0	BRL	118	70-130		
Trichloroethene	19.5		µg/l		20.0	BRL	98	70-130		
Trichlorofluoromethane (Freon 11)	15.6		µg/l		20.0	BRL	78	70-130		
1,2,3-Trichloropropane	21.8		µg/l		20.0	BRL	109	70-130		

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* Reportable Detection Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
<u>Matrix Spike (1105106-MS1)</u>			<u>Source: SB25934-03</u>		<u>Prepared & Analyzed: 24-Mar-11</u>					
1,2,4-Trimethylbenzene	21.0		µg/l		20.0	BRL	105	70-130		
1,3,5-Trimethylbenzene	20.2		µg/l		20.0	BRL	101	70-130		
Vinyl chloride	14.9		µg/l		20.0	BRL	74	70-130		
m,p-Xylene	37.2		µg/l		40.0	BRL	93	70-130		
o-Xylene	19.1		µg/l		20.0	BRL	95	70-130		
Tetrahydrofuran	19.2		µg/l		20.0	BRL	96	70-130		
Ethyl ether	21.7		µg/l		20.0	BRL	109	70-130		
Tert-amyl methyl ether	20.2		µg/l		20.0	BRL	101	70-130		
Ethyl tert-butyl ether	23.9		µg/l		20.0	BRL	120	70-130		
Di-isopropyl ether	25.7		µg/l		20.0	BRL	129	70-130		
Tert-Butanol / butyl alcohol	212		µg/l		200	BRL	106	70-130		
1,4-Dioxane	280	QM7	µg/l		200	BRL	140	70-130		
trans-1,4-Dichloro-2-butene	19.9		µg/l		20.0	BRL	99	70-130		
Ethanol	554	QM7	µg/l		400	BRL	139	70-130		
<i>Surrogate: 4-Bromofluorobenzene</i>	30.7		µg/l		30.0		102	70-130		
<i>Surrogate: Toluene-d8</i>	30.9		µg/l		30.0		103	70-130		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	38.2		µg/l		30.0		127	70-130		
<i>Surrogate: Dibromofluoromethane</i>	38.2		µg/l		30.0		127	70-130		
<u>Matrix Spike Dup (1105106-MSD1)</u>			<u>Source: SB25934-03</u>		<u>Prepared & Analyzed: 24-Mar-11</u>					
1,1,2-Trichlorotrifluoroethane (Freon 113)	24.2	QR2	µg/l		20.0	BRL	121	70-130	47	30
Acetone	24.2	QR5	µg/l		20.0	BRL	121	70-130	79	30
Acrylonitrile	21.5		µg/l		20.0	BRL	107	70-130	26	30
Benzene	17.9		µg/l		20.0	BRL	90	70-130	3	30
Bromobenzene	19.9		µg/l		20.0	BRL	100	70-130	8	30
Bromochloromethane	19.3		µg/l		20.0	BRL	96	70-130	18	30
Bromodichloromethane	19.9		µg/l		20.0	BRL	99	70-130	17	30
Bromoform	17.0		µg/l		20.0	BRL	85	70-130	16	30
Bromomethane	17.3		µg/l		20.0	BRL	87	70-130	4	30
2-Butanone (MEK)	19.4		µg/l		20.0	BRL	97	70-130	24	30
n-Butylbenzene	23.6		µg/l		20.0	BRL	118	70-130	18	30
sec-Butylbenzene	21.8		µg/l		20.0	BRL	109	70-130	17	30
tert-Butylbenzene	21.5		µg/l		20.0	BRL	108	70-130	11	30
Carbon disulfide	10.9	QM7	µg/l		20.0	BRL	55	70-130	25	30
Carbon tetrachloride	17.0		µg/l		20.0	BRL	85	70-130	26	30
Chlorobenzene	19.4		µg/l		20.0	BRL	97	70-130	1	30
Chloroethane	18.6		µg/l		20.0	BRL	93	70-130	6	30
Chloroform	21.6		µg/l		20.0	BRL	108	70-130	5	30
Chloromethane	11.8	QM7	µg/l		20.0	BRL	59	70-130	3	30
2-Chlorotoluene	20.5		µg/l		20.0	BRL	102	70-130	1	30
4-Chlorotoluene	21.0		µg/l		20.0	BRL	105	70-130	2	30
1,2-Dibromo-3-chloropropane	13.8	QM7	µg/l		20.0	BRL	69	70-130	2	30
Dibromochloromethane	18.6		µg/l		20.0	BRL	93	70-130	9	30
1,2-Dibromoethane (EDB)	17.5		µg/l		20.0	BRL	88	70-130	20	30
Dibromomethane	18.3		µg/l		20.0	BRL	91	70-130	25	30
1,2-Dichlorobenzene	19.2		µg/l		20.0	BRL	96	70-130	7	30
1,3-Dichlorobenzene	20.4		µg/l		20.0	BRL	102	70-130	2	30
1,4-Dichlorobenzene	19.8		µg/l		20.0	BRL	99	70-130	1	30
Dichlorodifluoromethane (Freon12)	18.6	QR5	µg/l		20.0	BRL	93	70-130	43	30
1,1-Dichloroethane	21.4		µg/l		20.0	BRL	107	70-130	5	30
1,2-Dichloroethane	18.4		µg/l		20.0	BRL	92	70-130	21	30
1,1-Dichloroethene	19.1		µg/l		20.0	BRL	95	70-130	17	30

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105106 - SW846 5030 Water MS										
<u>Matrix Spike Dup (1105106-MSD1)</u>				<u>Source: SB25934-03</u>				<u>Prepared & Analyzed: 24-Mar-11</u>		
cis-1,2-Dichloroethene	20.7		µg/l		20.0	BRL	103	70-130	8	30
trans-1,2-Dichloroethene	18.5		µg/l		20.0	BRL	92	70-130	2	30
1,2-Dichloropropane	19.0		µg/l		20.0	BRL	95	70-130	11	30
1,3-Dichloropropane	18.6		µg/l		20.0	BRL	93	70-130	23	30
2,2-Dichloropropane	18.4		µg/l		20.0	BRL	92	70-130	19	30
1,1-Dichloropropene	19.0		µg/l		20.0	BRL	95	70-130	17	30
cis-1,3-Dichloropropene	17.0		µg/l		20.0	BRL	85	70-130	12	30
trans-1,3-Dichloropropene	15.3		µg/l		20.0	BRL	76	70-130	12	30
Ethylbenzene	20.6		µg/l		20.0	BRL	103	70-130	11	30
Hexachlorobutadiene	21.7		µg/l		20.0	BRL	108	70-130	4	30
2-Hexanone (MBK)	18.4		µg/l		20.0	BRL	92	70-130	30	30
Isopropylbenzene	21.2		µg/l		20.0	BRL	106	70-130	16	30
4-Isopropyltoluene	22.5		µg/l		20.0	BRL	113	70-130	18	30
Methyl tert-butyl ether	20.3		µg/l		20.0	BRL	101	70-130	22	30
4-Methyl-2-pentanone (MIBK)	14.2	QR5	µg/l		20.0	BRL	71	70-130	63	30
Methylene chloride	18.4		µg/l		20.0	BRL	92	70-130	15	30
Naphthalene	29.4		µg/l		20.0	9.0	102	70-130	28	30
n-Propylbenzene	22.2		µg/l		20.0	BRL	111	70-130	14	30
Styrene	18.7		µg/l		20.0	BRL	94	70-130	8	30
1,1,1,2-Tetrachloroethane	17.5		µg/l		20.0	BRL	88	70-130	2	30
1,1,2,2-Tetrachloroethane	19.5		µg/l		20.0	BRL	97	70-130	17	30
Tetrachloroethene	19.7		µg/l		20.0	BRL	98	70-130	11	30
Toluene	18.2		µg/l		20.0	BRL	91	70-130	4	30
1,2,3-Trichlorobenzene	18.3		µg/l		20.0	BRL	92	70-130	23	30
1,2,4-Trichlorobenzene	19.3		µg/l		20.0	BRL	97	70-130	19	30
1,3,5-Trichlorobenzene	20.0		µg/l		20.0	BRL	100	70-130	4	30
1,1,1-Trichloroethane	19.8		µg/l		20.0	BRL	99	70-130	20	30
1,1,2-Trichloroethane	18.8		µg/l		20.0	BRL	94	70-130	22	30
Trichloroethene	19.4		µg/l		20.0	BRL	97	70-130	0.4	30
Trichlorofluoromethane (Freon 11)	21.7	QR2	µg/l		20.0	BRL	109	70-130	33	30
1,2,3-Trichloropropane	19.1		µg/l		20.0	BRL	95	70-130	13	30
1,2,4-Trimethylbenzene	21.9		µg/l		20.0	BRL	110	70-130	4	30
1,3,5-Trimethylbenzene	21.5		µg/l		20.0	BRL	107	70-130	6	30
Vinyl chloride	17.6		µg/l		20.0	BRL	88	70-130	17	30
m,p-Xylene	40.0		µg/l		40.0	BRL	100	70-130	7	30
o-Xylene	20.3		µg/l		20.0	BRL	101	70-130	6	30
Tetrahydrofuran	17.2		µg/l		20.0	BRL	86	70-130	11	30
Ethyl ether	17.2		µg/l		20.0	BRL	86	70-130	23	30
Tert-amyl methyl ether	16.7		µg/l		20.0	BRL	84	70-130	19	30
Ethyl tert-butyl ether	20.5		µg/l		20.0	BRL	103	70-130	15	30
Di-isopropyl ether	21.5		µg/l		20.0	BRL	108	70-130	18	30
Tert-Butanol / butyl alcohol	176		µg/l		200	BRL	88	70-130	18	30
1,4-Dioxane	173	QR5	µg/l		200	BRL	86	70-130	47	30
trans-1,4-Dichloro-2-butene	16.9		µg/l		20.0	BRL	85	70-130	16	30
Ethanol	382	QR5	µg/l		400	BRL	95	70-130	37	30
Surrogate: 4-Bromofluorobenzene	30.5		µg/l		30.0		102	70-130		
Surrogate: Toluene-d8	29.9		µg/l		30.0		100	70-130		
Surrogate: 1,2-Dichloroethane-d4	32.0		µg/l		30.0		106	70-130		
Surrogate: Dibromofluoromethane	34.6		µg/l		30.0		115	70-130		

Batch 1105196 - SW846 5030 Water MS

Blank (1105196-BLK1)

Prepared & Analyzed: 25-Mar-11

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105196 - SW846 5030 Water MS										
Blank (1105196-BLK1)										<u>Prepared & Analyzed: 25-Mar-11</u>
1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0						
Acetone	BRL		µg/l	10.0						
Acrylonitrile	BRL		µg/l	0.5						
Benzene	BRL		µg/l	1.0						
Bromobenzene	BRL		µg/l	1.0						
Bromochloromethane	BRL		µg/l	1.0						
Bromodichloromethane	BRL		µg/l	0.5						
Bromoform	BRL		µg/l	1.0						
Bromomethane	BRL		µg/l	2.0						
2-Butanone (MEK)	BRL		µg/l	10.0						
n-Butylbenzene	BRL		µg/l	1.0						
sec-Butylbenzene	BRL		µg/l	1.0						
tert-Butylbenzene	BRL		µg/l	1.0						
Carbon disulfide	BRL		µg/l	2.0						
Carbon tetrachloride	BRL		µg/l	1.0						
Chlorobenzene	BRL		µg/l	1.0						
Chloroethane	BRL		µg/l	2.0						
Chloroform	BRL		µg/l	1.0						
Chloromethane	BRL		µg/l	2.0						
2-Chlorotoluene	BRL		µg/l	1.0						
4-Chlorotoluene	BRL		µg/l	1.0						
1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0						
Dibromochloromethane	BRL		µg/l	0.5						
1,2-Dibromoethane (EDB)	BRL		µg/l	0.5						
Dibromomethane	BRL		µg/l	1.0						
1,2-Dichlorobenzene	BRL		µg/l	1.0						
1,3-Dichlorobenzene	BRL		µg/l	1.0						
1,4-Dichlorobenzene	BRL		µg/l	1.0						
Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0						
1,1-Dichloroethane	BRL		µg/l	1.0						
1,2-Dichloroethane	BRL		µg/l	1.0						
1,1-Dichloroethene	BRL		µg/l	1.0						
cis-1,2-Dichloroethene	BRL		µg/l	1.0						
trans-1,2-Dichloroethene	BRL		µg/l	1.0						
1,2-Dichloropropane	BRL		µg/l	1.0						
1,3-Dichloropropane	BRL		µg/l	1.0						
2,2-Dichloropropane	BRL		µg/l	1.0						
1,1-Dichloropropene	BRL		µg/l	1.0						
cis-1,3-Dichloropropene	BRL		µg/l	0.5						
trans-1,3-Dichloropropene	BRL		µg/l	0.5						
Ethylbenzene	BRL		µg/l	1.0						
Hexachlorobutadiene	BRL		µg/l	0.5						
2-Hexanone (MBK)	BRL		µg/l	10.0						
Isopropylbenzene	BRL		µg/l	1.0						
4-Isopropyltoluene	BRL		µg/l	1.0						
Methyl tert-butyl ether	BRL		µg/l	1.0						
4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0						
Methylene chloride	BRL		µg/l	2.0						
Naphthalene	BRL		µg/l	1.0						
n-Propylbenzene	BRL		µg/l	1.0						
Styrene	BRL		µg/l	1.0						
1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0						

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* Reportable Detection Limit

BRL = Below Reporting Limit

Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105196 - SW846 5030 Water MS										
Blank (1105196-BLK1)					<u>Prepared & Analyzed: 25-Mar-11</u>					
1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5						
Tetrachloroethene	BRL		µg/l	1.0						
Toluene	BRL		µg/l	1.0						
1,2,3-Trichlorobenzene	BRL		µg/l	1.0						
1,2,4-Trichlorobenzene	BRL		µg/l	1.0						
1,3,5-Trichlorobenzene	BRL		µg/l	1.0						
1,1,1-Trichloroethane	BRL		µg/l	1.0						
1,1,2-Trichloroethane	BRL		µg/l	1.0						
Trichloroethene	BRL		µg/l	1.0						
Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0						
1,2,3-Trichloropropane	BRL		µg/l	1.0						
1,2,4-Trimethylbenzene	BRL		µg/l	1.0						
1,3,5-Trimethylbenzene	BRL		µg/l	1.0						
Vinyl chloride	BRL		µg/l	1.0						
m,p-Xylene	BRL		µg/l	2.0						
o-Xylene	BRL		µg/l	1.0						
Tetrahydrofuran	BRL		µg/l	2.0						
Ethyl ether	BRL		µg/l	1.0						
Tert-amyl methyl ether	BRL		µg/l	1.0						
Ethyl tert-butyl ether	BRL		µg/l	1.0						
Di-isopropyl ether	BRL		µg/l	1.0						
Tert-Butanol / butyl alcohol	BRL		µg/l	10.0						
1,4-Dioxane	BRL		µg/l	20.0						
trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0						
Ethanol	BRL		µg/l	400						
<i>Surrogate: 4-Bromofluorobenzene</i>	46.7		µg/l		50.0		93	70-130		
<i>Surrogate: Toluene-d8</i>	50.6		µg/l		50.0		101	70-130		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	56.7		µg/l		50.0		113	70-130		
<i>Surrogate: Dibromofluoromethane</i>	52.6		µg/l		50.0		105	70-130		
LCS (1105196-BS1)					<u>Prepared & Analyzed: 25-Mar-11</u>					
1,1,2-Trichlorotrifluoroethane (Freon 113)	19.1		µg/l		20.0		96	70-130		
Acetone	23.5		µg/l		20.0		117	70-130		
Acrylonitrile	24.3		µg/l		20.0		121	70-130		
Benzene	19.4		µg/l		20.0		97	70-130		
Bromobenzene	19.5		µg/l		20.0		97	70-130		
Bromochloromethane	19.2		µg/l		20.0		96	70-130		
Bromodichloromethane	21.6		µg/l		20.0		108	70-130		
Bromoform	22.0		µg/l		20.0		110	70-130		
Bromomethane	25.0		µg/l		20.0		125	70-130		
2-Butanone (MEK)	16.8		µg/l		20.0		84	70-130		
n-Butylbenzene	20.6		µg/l		20.0		103	70-130		
sec-Butylbenzene	22.1		µg/l		20.0		110	70-130		
tert-Butylbenzene	22.4		µg/l		20.0		112	70-130		
Carbon disulfide	21.6		µg/l		20.0		108	70-130		
Carbon tetrachloride	21.1		µg/l		20.0		105	70-130		
Chlorobenzene	19.5		µg/l		20.0		98	70-130		
Chloroethane	21.2		µg/l		20.0		106	70-130		
Chloroform	20.3		µg/l		20.0		102	70-130		
Chloromethane	29.3		µg/l		20.0		146	70-130		
2-Chlorotoluene	23.0		µg/l		20.0		115	70-130		
4-Chlorotoluene	21.6		µg/l		20.0		108	70-130		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105196 - SW846 5030 Water MS										
<u>LCS (1105196-BS1)</u>	<u>Prepared & Analyzed: 25-Mar-11</u>									
1,2-Dibromo-3-chloropropane	21.9		µg/l		20.0		110	70-130		
Dibromochloromethane	22.2		µg/l		20.0		111	70-130		
1,2-Dibromoethane (EDB)	19.9		µg/l		20.0		99	70-130		
Dibromomethane	18.8		µg/l		20.0		94	70-130		
1,2-Dichlorobenzene	19.8		µg/l		20.0		99	70-130		
1,3-Dichlorobenzene	19.7		µg/l		20.0		98	70-130		
1,4-Dichlorobenzene	18.2		µg/l		20.0		91	70-130		
Dichlorodifluoromethane (Freon12)	20.1		µg/l		20.0		100	70-130		
1,1-Dichloroethane	20.4		µg/l		20.0		102	70-130		
1,2-Dichloroethane	20.7		µg/l		20.0		103	70-130		
1,1-Dichloroethene	20.5		µg/l		20.0		102	70-130		
cis-1,2-Dichloroethene	20.3		µg/l		20.0		101	70-130		
trans-1,2-Dichloroethene	19.6		µg/l		20.0		98	70-130		
1,2-Dichloropropane	19.0		µg/l		20.0		95	70-130		
1,3-Dichloropropane	19.6		µg/l		20.0		98	70-130		
2,2-Dichloropropane	19.7		µg/l		20.0		98	70-130		
1,1-Dichloropropene	19.0		µg/l		20.0		95	70-130		
cis-1,3-Dichloropropene	20.3		µg/l		20.0		101	70-130		
trans-1,3-Dichloropropene	21.2		µg/l		20.0		106	70-130		
Ethylbenzene	20.7		µg/l		20.0		103	70-130		
Hexachlorobutadiene	17.6		µg/l		20.0		88	70-130		
2-Hexanone (MBK)	21.8		µg/l		20.0		109	70-130		
Isopropylbenzene	20.6		µg/l		20.0		103	70-130		
4-Isopropyltoluene	19.8		µg/l		20.0		99	70-130		
Methyl tert-butyl ether	16.7		µg/l		20.0		84	70-130		
4-Methyl-2-pentanone (MIBK)	22.0		µg/l		20.0		110	70-130		
Methylene chloride	23.8		µg/l		20.0		119	70-130		
Naphthalene	25.4		µg/l		20.0		127	70-130		
n-Propylbenzene	21.6		µg/l		20.0		108	70-130		
Styrene	21.6		µg/l		20.0		108	70-130		
1,1,1,2-Tetrachloroethane	21.3		µg/l		20.0		107	70-130		
1,1,2,2-Tetrachloroethane	19.7		µg/l		20.0		99	70-130		
Tetrachloroethene	17.8		µg/l		20.0		89	70-130		
Toluene	18.4		µg/l		20.0		92	70-130		
1,2,3-Trichlorobenzene	21.2		µg/l		20.0		106	70-130		
1,2,4-Trichlorobenzene	20.2		µg/l		20.0		101	70-130		
1,3,5-Trichlorobenzene	18.0		µg/l		20.0		90	70-130		
1,1,1-Trichloroethane	20.4		µg/l		20.0		102	70-130		
1,1,2-Trichloroethane	20.0		µg/l		20.0		100	70-130		
Trichloroethene	19.2		µg/l		20.0		96	70-130		
Trichlorofluoromethane (Freon 11)	21.1		µg/l		20.0		105	70-130		
1,2,3-Trichloropropane	20.6		µg/l		20.0		103	70-130		
1,2,4-Trimethylbenzene	22.6		µg/l		20.0		113	70-130		
1,3,5-Trimethylbenzene	22.0		µg/l		20.0		110	70-130		
Vinyl chloride	29.2	QM9	µg/l		20.0		146	70-130		
m,p-Xylene	41.8		µg/l		40.0		105	70-130		
o-Xylene	21.7		µg/l		20.0		109	70-130		
Tetrahydrofuran	21.3		µg/l		20.0		106	70-130		
Ethyl ether	19.4		µg/l		20.0		97	70-130		
Tert-amyl methyl ether	24.4		µg/l		20.0		122	70-130		
Ethyl tert-butyl ether	21.0		µg/l		20.0		105	70-130		
Di-isopropyl ether	20.1		µg/l		20.0		100	70-130		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105196 - SW846 5030 Water MS										
<u>LCS (1105196-BS1)</u>					<u>Prepared & Analyzed: 25-Mar-11</u>					
Tert-Butanol / butyl alcohol	215		µg/l		200		107	70-130		
1,4-Dioxane	194		µg/l		200		97	70-130		
trans-1,4-Dichloro-2-butene	19.5		µg/l		20.0		97	70-130		
Ethanol	481		µg/l		400		120	70-130		
Surrogate: 4-Bromofluorobenzene	52.6		µg/l		50.0		105	70-130		
Surrogate: Toluene-d8	49.3		µg/l		50.0		99	70-130		
Surrogate: 1,2-Dichloroethane-d4	54.2		µg/l		50.0		108	70-130		
Surrogate: Dibromofluoromethane	50.9		µg/l		50.0		102	70-130		
<u>LCS Dup (1105196-BSD1)</u>					<u>Prepared & Analyzed: 25-Mar-11</u>					
1,1,2-Trichlorotrifluoroethane (Freon 113)	17.4		µg/l		20.0		87	70-130	9	25
Acetone	25.6		µg/l		20.0		128	70-130	9	50
Acrylonitrile	21.5		µg/l		20.0		108	70-130	12	25
Benzene	18.3		µg/l		20.0		92	70-130	6	25
Bromobenzene	18.0		µg/l		20.0		90	70-130	8	25
Bromochloromethane	19.2		µg/l		20.0		96	70-130	0.1	25
Bromodichloromethane	20.9		µg/l		20.0		104	70-130	3	25
Bromoform	22.4		µg/l		20.0		112	70-130	2	25
Bromomethane	23.9		µg/l		20.0		120	70-130	4	50
2-Butanone (MEK)	16.3		µg/l		20.0		81	70-130	3	50
n-Butylbenzene	19.5		µg/l		20.0		98	70-130	5	25
sec-Butylbenzene	20.6		µg/l		20.0		103	70-130	7	25
tert-Butylbenzene	20.6		µg/l		20.0		103	70-130	9	25
Carbon disulfide	20.0		µg/l		20.0		100	70-130	8	25
Carbon tetrachloride	19.4		µg/l		20.0		97	70-130	8	25
Chlorobenzene	18.4		µg/l		20.0		92	70-130	6	25
Chloroethane	20.2		µg/l		20.0		101	70-130	5	50
Chloroform	19.3		µg/l		20.0		96	70-130	5	25
Chloromethane	23.6		µg/l		20.0		118	70-130	22	25
2-Chlorotoluene	21.7		µg/l		20.0		108	70-130	6	25
4-Chlorotoluene	20.4		µg/l		20.0		102	70-130	6	25
1,2-Dibromo-3-chloropropane	22.5		µg/l		20.0		113	70-130	3	25
Dibromochloromethane	21.3		µg/l		20.0		107	70-130	4	50
1,2-Dibromoethane (EDB)	19.4		µg/l		20.0		97	70-130	2	25
Dibromomethane	18.7		µg/l		20.0		93	70-130	0.8	25
1,2-Dichlorobenzene	19.1		µg/l		20.0		96	70-130	3	25
1,3-Dichlorobenzene	18.9		µg/l		20.0		94	70-130	4	25
1,4-Dichlorobenzene	17.9		µg/l		20.0		90	70-130	1	25
Dichlorodifluoromethane (Freon12)	17.3		µg/l		20.0		86	70-130	15	50
1,1-Dichloroethane	19.5		µg/l		20.0		97	70-130	5	25
1,2-Dichloroethane	20.2		µg/l		20.0		101	70-130	3	25
1,1-Dichloroethene	18.3		µg/l		20.0		91	70-130	11	25
cis-1,2-Dichloroethene	19.6		µg/l		20.0		98	70-130	3	25
trans-1,2-Dichloroethene	17.5		µg/l		20.0		87	70-130	11	25
1,2-Dichloropropane	18.2		µg/l		20.0		91	70-130	4	25
1,3-Dichloropropane	18.8		µg/l		20.0		94	70-130	4	25
2,2-Dichloropropane	18.2		µg/l		20.0		91	70-130	8	25
1,1-Dichloropropene	17.6		µg/l		20.0		88	70-130	8	25
cis-1,3-Dichloropropene	19.1		µg/l		20.0		95	70-130	6	25
trans-1,3-Dichloropropene	21.0		µg/l		20.0		105	70-130	1	25
Ethylbenzene	19.7		µg/l		20.0		98	70-130	5	25
Hexachlorobutadiene	17.3		µg/l		20.0		87	70-130	2	50

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105196 - SW846 5030 Water MS										
<u>LCS Dup (1105196-BSD1)</u>	<u>Prepared & Analyzed: 25-Mar-11</u>									
2-Hexanone (MBK)	21.6		µg/l		20.0		108	70-130	0.8	25
Isopropylbenzene	19.5		µg/l		20.0		98	70-130	5	25
4-Isopropyltoluene	19.0		µg/l		20.0		95	70-130	4	25
Methyl tert-butyl ether	16.7		µg/l		20.0		84	70-130	0.06	25
4-Methyl-2-pentanone (MIBK)	21.6		µg/l		20.0		108	70-130	2	50
Methylene chloride	22.7		µg/l		20.0		114	70-130	5	25
Naphthalene	24.4		µg/l		20.0		122	70-130	4	25
n-Propylbenzene	20.1		µg/l		20.0		100	70-130	7	25
Styrene	20.8		µg/l		20.0		104	70-130	4	25
1,1,1,2-Tetrachloroethane	19.7		µg/l		20.0		99	70-130	8	25
1,1,2,2-Tetrachloroethane	19.2		µg/l		20.0		96	70-130	3	25
Tetrachloroethene	16.7		µg/l		20.0		84	70-130	6	25
Toluene	17.5		µg/l		20.0		87	70-130	5	25
1,2,3-Trichlorobenzene	20.7		µg/l		20.0		104	70-130	2	25
1,2,4-Trichlorobenzene	19.6		µg/l		20.0		98	70-130	3	25
1,3,5-Trichlorobenzene	17.8		µg/l		20.0		89	70-130	0.8	25
1,1,1-Trichloroethane	19.6		µg/l		20.0		98	70-130	4	25
1,1,2-Trichloroethane	19.4		µg/l		20.0		97	70-130	3	25
Trichloroethene	18.4		µg/l		20.0		92	70-130	5	25
Trichlorofluoromethane (Freon 11)	20.2		µg/l		20.0		101	70-130	4	50
1,2,3-Trichloropropane	21.2		µg/l		20.0		106	70-130	3	25
1,2,4-Trimethylbenzene	21.2		µg/l		20.0		106	70-130	6	25
1,3,5-Trimethylbenzene	20.8		µg/l		20.0		104	70-130	6	25
Vinyl chloride	25.4		µg/l		20.0		127	70-130	14	25
m,p-Xylene	39.7		µg/l		40.0		99	70-130	5	25
o-Xylene	20.7		µg/l		20.0		104	70-130	5	25
Tetrahydrofuran	22.0		µg/l		20.0		110	70-130	3	25
Ethyl ether	21.5		µg/l		20.0		108	70-130	11	50
Tert-amyl methyl ether	23.2		µg/l		20.0		116	70-130	5	25
Ethyl tert-butyl ether	20.5		µg/l		20.0		102	70-130	2	25
Di-isopropyl ether	20.2		µg/l		20.0		101	70-130	0.4	25
Tert-Butanol / butyl alcohol	208		µg/l		200		104	70-130	3	25
1,4-Dioxane	199		µg/l		200		100	70-130	3	25
trans-1,4-Dichloro-2-butene	15.8		µg/l		20.0		79	70-130	21	25
Ethanol	515		µg/l		400		129	70-130	7	30
Surrogate: 4-Bromofluorobenzene	52.6		µg/l		50.0		105	70-130		
Surrogate: Toluene-d8	48.9		µg/l		50.0		98	70-130		
Surrogate: 1,2-Dichloroethane-d4	53.0		µg/l		50.0		106	70-130		
Surrogate: Dibromofluoromethane	49.9		µg/l		50.0		100	70-130		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105003 - SW846 3510C										
Blank (1105003-BLK1)					<u>Prepared & Analyzed: 23-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.05						
C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.05						
C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.05						
Unadjusted C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.05						
Total Petroleum Hydrocarbons	BRL		mg/l	0.05						
Unadjusted Total Petroleum Hydrocarbons	BRL		mg/l	0.05						
Naphthalene	BRL		µg/l	1.00						
2-Methylnaphthalene	BRL		µg/l	1.00						
Acenaphthylene	BRL		µg/l	1.00						
Acenaphthene	BRL		µg/l	1.00						
Fluorene	BRL		µg/l	1.00						
Phenanthrene	BRL		µg/l	1.00						
Anthracene	BRL		µg/l	1.00						
Fluoranthene	BRL		µg/l	1.00						
Pyrene	BRL		µg/l	1.00						
Benzo (a) anthracene	BRL		µg/l	1.00						
Chrysene	BRL		µg/l	1.00						
Benzo (b) fluoranthene	BRL		µg/l	1.00						
Benzo (k) fluoranthene	BRL		µg/l	1.00						
Benzo (a) pyrene	BRL		µg/l	0.200						
Indeno (1,2,3-cd) pyrene	BRL		µg/l	0.500						
Dibenzo (a,h) anthracene	BRL		µg/l	0.500						
Benzo (g,h,i) perylene	BRL		µg/l	1.00						
Naphthalene (aliphatic fraction)	0.00		µg/l							
2-Methylnaphthalene (aliphatic fraction)	0.00		µg/l							
<i>Surrogate: 1-Chlorooctadecane</i>	43.2		µg/l		50.0		86	40-140		
<i>Surrogate: Ortho-Terphenyl</i>	33.8		µg/l		50.0		68	40-140		
<i>Surrogate: 2-Fluorobiphenyl</i>	27.5		µg/l		40.0		69	40-140		
LCS (1105003-BS1)					<u>Prepared & Analyzed: 23-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	0.331		mg/l	0.05	0.600		55	40-140		
C19-C36 Aliphatic Hydrocarbons	0.610		mg/l	0.05	0.800		76	40-140		
C11-C22 Aromatic Hydrocarbons	1.00		mg/l	0.05	1.70		59	40-140		
Naphthalene	40.4		µg/l	1.00	100		40	40-140		
2-Methylnaphthalene	45.8		µg/l	1.00	100		46	40-140		
Acenaphthylene	53.2		µg/l	1.00	100		53	40-140		
Acenaphthene	54.9		µg/l	1.00	100		55	40-140		
Fluorene	61.2		µg/l	1.00	100		61	40-140		
Phenanthrene	68.5		µg/l	1.00	100		69	40-140		
Anthracene	69.9		µg/l	1.00	100		70	40-140		
Fluoranthene	75.0		µg/l	1.00	100		75	40-140		
Pyrene	76.0		µg/l	1.00	100		76	40-140		
Benzo (a) anthracene	76.9		µg/l	1.00	100		77	40-140		
Chrysene	79.5		µg/l	1.00	100		79	40-140		
Benzo (b) fluoranthene	71.6		µg/l	1.00	100		72	40-140		
Benzo (k) fluoranthene	82.0		µg/l	1.00	100		82	40-140		
Benzo (a) pyrene	71.3		µg/l	0.200	100		71	40-140		
Indeno (1,2,3-cd) pyrene	67.7		µg/l	0.500	100		68	40-140		
Dibenzo (a,h) anthracene	68.8		µg/l	0.500	100		69	40-140		
Benzo (g,h,i) perylene	70.0		µg/l	1.00	100		70	40-140		
Naphthalene (aliphatic fraction)	0.000100		µg/l		100		0.0001	0-200		
2-Methylnaphthalene (aliphatic fraction)	0.000100		µg/l		100		0.0001	0-200		

This laboratory report is not valid without an authorized signature on the cover page.

* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105003 - SW846 3510C										
<u>LCS (1105003-BS1)</u>					<u>Prepared & Analyzed: 23-Mar-11</u>					
Surrogate: 1-Chlorooctadecane	35.1		µg/l		50.0		70	40-140		
Surrogate: Ortho-Terphenyl	32.6		µg/l		50.0		65	40-140		
Surrogate: 2-Fluorobiphenyl	28.5		µg/l		40.0		71	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS (1105003-BS2)</u>					<u>Prepared: 23-Mar-11 Analyzed: 24-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	0.355		mg/l	0.05	0.600		59	40-140		
C19-C36 Aliphatic Hydrocarbons	0.545		mg/l	0.05	0.800		68	40-140		
C11-C22 Aromatic Hydrocarbons	0.870		mg/l	0.05	1.70		51	40-140		
Naphthalene	42.1		µg/l	1.00	100		42	40-140		
2-Methylnaphthalene	45.8		µg/l	1.00	100		46	40-140		
Acenaphthylene	51.5		µg/l	1.00	100		52	40-140		
Acenaphthene	52.1		µg/l	1.00	100		52	40-140		
Fluorene	55.1		µg/l	1.00	100		55	40-140		
Phenanthrene	59.5		µg/l	1.00	100		60	40-140		
Anthracene	59.6		µg/l	1.00	100		60	40-140		
Fluoranthene	63.3		µg/l	1.00	100		63	40-140		
Pyrene	63.8		µg/l	1.00	100		64	40-140		
Benzo (a) anthracene	63.5		µg/l	1.00	100		64	40-140		
Chrysene	68.4		µg/l	1.00	100		68	40-140		
Benzo (b) fluoranthene	69.8		µg/l	1.00	100		70	40-140		
Benzo (k) fluoranthene	72.1		µg/l	1.00	100		72	40-140		
Benzo (a) pyrene	62.6		µg/l	0.200	100		63	40-140		
Indeno (1,2,3-cd) pyrene	61.1		µg/l	0.500	100		61	40-140		
Dibenzo (a,h) anthracene	62.6		µg/l	0.500	100		63	40-140		
Benzo (g,h,i) perylene	64.9		µg/l	1.00	100		65	40-140		
Naphthalene (aliphatic fraction)	0.00		µg/l		100			0-200		
2-Methylnaphthalene (aliphatic fraction)	0.00		µg/l		100			0-200		
Surrogate: 1-Chlorooctadecane	32.1		µg/l		50.0		64	40-140		
Surrogate: Ortho-Terphenyl	29.1		µg/l		50.0		58	40-140		
Surrogate: 2-Fluorobiphenyl	20.9		µg/l		40.0		52	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS Dup (1105003-BSD1)</u>					<u>Prepared & Analyzed: 23-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	0.319		mg/l	0.05	0.600		53	40-140	4	25
C19-C36 Aliphatic Hydrocarbons	0.585		mg/l	0.05	0.800		73	40-140	4	25
C11-C22 Aromatic Hydrocarbons	0.950		mg/l	0.05	1.70		56	40-140	5	25
Naphthalene	40.6		µg/l	1.00	100		41	40-140	0.4	25
2-Methylnaphthalene	42.6		µg/l	1.00	100		43	40-140	7	25
Acenaphthylene	52.3		µg/l	1.00	100		52	40-140	2	25
Acenaphthene	50.8		µg/l	1.00	100		51	40-140	8	25
Fluorene	55.7		µg/l	1.00	100		56	40-140	10	25
Phenanthrene	64.6		µg/l	1.00	100		65	40-140	6	25
Anthracene	64.3		µg/l	1.00	100		64	40-140	8	25
Fluoranthene	69.1		µg/l	1.00	100		69	40-140	8	25
Pyrene	69.6		µg/l	1.00	100		70	40-140	9	25
Benzo (a) anthracene	69.2		µg/l	1.00	100		69	40-140	11	25
Chrysene	73.1		µg/l	1.00	100		73	40-140	8	25
Benzo (b) fluoranthene	78.4		µg/l	1.00	100		78	40-140	9	25
Benzo (k) fluoranthene	75.8		µg/l	1.00	100		76	40-140	8	25

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1105003 - SW846 3510C										
<u>LCS Dup (1105003-BSD1)</u>					<u>Prepared & Analyzed: 23-Mar-11</u>					
Benzo (a) pyrene	64.6		µg/l	0.200	100		65	40-140	10	25
Indeno (1,2,3-cd) pyrene	63.2		µg/l	0.500	100		63	40-140	7	25
Dibenzo (a,h) anthracene	64.8		µg/l	0.500	100		65	40-140	6	25
Benzo (g,h,i) perylene	64.9		µg/l	1.00	100		65	40-140	8	25
Naphthalene (aliphatic fraction)	0.000100		µg/l		100		0.0001	0-200	0	200
2-Methylnaphthalene (aliphatic fraction)	0.000100		µg/l		100		0.0001	0-200	0	200
Surrogate: 1-Chlorooctadecane	33.3		µg/l		50.0		67	40-140		
Surrogate: Ortho-Terphenyl	34.3		µg/l		50.0		69	40-140		
Surrogate: 2-Fluorobiphenyl	30.7		µg/l		40.0		77	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>Duplicate (1105003-DUP1)</u>			<u>Source: SB25934-01</u>		<u>Prepared: 23-Mar-11 Analyzed: 24-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1		BRL				50
C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1		BRL				50
C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1		BRL				50
Unadjusted C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1		BRL				50
Total Petroleum Hydrocarbons	BRL		mg/l	0.1		BRL				50
Unadjusted Total Petroleum Hydrocarbons	BRL		mg/l	0.1		BRL				50
Naphthalene	BRL		µg/l	1.00		BRL				50
2-Methylnaphthalene	BRL		µg/l	1.00		BRL				50
Acenaphthylene	BRL		µg/l	1.00		BRL				50
Acenaphthene	BRL		µg/l	1.00		BRL				50
Fluorene	BRL		µg/l	1.00		BRL				50
Phenanthrene	BRL		µg/l	1.00		BRL				50
Anthracene	BRL		µg/l	1.00		BRL				50
Fluoranthene	BRL		µg/l	1.00		BRL				50
Pyrene	BRL		µg/l	1.00		BRL				50
Benzo (a) anthracene	BRL		µg/l	1.00		BRL				50
Chrysene	BRL		µg/l	1.00		BRL				50
Benzo (b) fluoranthene	BRL		µg/l	1.00		BRL				50
Benzo (k) fluoranthene	BRL		µg/l	1.00		BRL				50
Benzo (a) pyrene	BRL		µg/l	0.200		BRL				50
Indeno (1,2,3-cd) pyrene	BRL		µg/l	0.500		BRL				50
Dibenzo (a,h) anthracene	BRL		µg/l	0.500		BRL				50
Benzo (g,h,i) perylene	BRL		µg/l	1.00		BRL				50
Surrogate: 1-Chlorooctadecane	32.7		µg/l		56.8		58	40-140		
Surrogate: Ortho-Terphenyl	32.0		µg/l		56.8		56	40-140		
Surrogate: 2-Fluorobiphenyl	31.8		µg/l		45.5		70	40-140		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - CCV Evaluation Report

Analyte(s)	Average RF	CCRF	% D	Limit
Batch S102238				
<u>Calibration Check (S102238-CCV1)</u>				
C9-C18 Aliphatic Hydrocarbons	1.917982E+08	1.70494E+08	2.2	25
C19-C36 Aliphatic Hydrocarbons	2.886707E+08	1.895553E+08	-1.6	25
C11-C22 Aromatic Hydrocarbons	17.79424	14.68873	-20.6	25
Naphthalene	8.291966	7.23061	-12.8	25
2-Methylnaphthalene	5.37928	4.679162	-13.0	25
Acenaphthylene	7.131872	6.940449	-2.7	25
Acenaphthene	4.885553	4.395657	-10.0	25
Fluorene	5.253678	4.798246	-8.7	25
Phenanthrene	6.681795	6.599715	-1.2	25
Anthracene	6.803102	6.647859	-2.3	25
Fluoranthene	6.840752	6.900217	0.9	25
Pyrene	6.957097	6.931021	-0.4	25
Benzo (a) anthracene	5.415309	5.41751	0.04	25
Chrysene	5.508209	5.703484	3.5	25
Benzo (b) fluoranthene	4.540565	5.000645	10.1	25
Benzo (k) fluoranthene	5.288965	5.684002	7.5	25
Benzo (a) pyrene	4.41144	4.366278	-1.0	25
Indeno (1,2,3-cd) pyrene	4.864981	5.262817	8.2	25
Dibenzo (a,h) anthracene	4.00496	4.254951	6.2	25
Benzo (g,h,i) perylene	4.182575	4.586142	9.6	25

Notes and Definitions

GS1	Sample dilution required for high concentration of target analytes to be within the instrument calibration range.
QM7	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
QM9	The spike recovery for this QC sample is outside the established control limits. The sample results for the QC batch were accepted based on LCS/LCSD or SRM recoveries within the control limits.
QR2	The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.
QR5	RPD out of acceptance range.
BRL	Below Reporting Limit - Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
NR	Not Reported
RPD	Relative Percent Difference

A plus sign (+) in the Method Reference column indicates the method is not accredited by NELAC.

A Matrix Spike and Matrix Spike Duplicate (MS/MSD) for MADEP EPH CAM may not have been analyzed with the samples in this work order. According to the method these spikes are performed only when requested by the client. If requested the spike recoveries are included in the batch QC data.

Laboratory Control Sample (LCS): A known matrix spiked with compound(s) representative of the target analytes, which is used to document laboratory performance.

Matrix Duplicate: An intra-laboratory split sample which is used to document the precision of a method in a given sample matrix.

Matrix Spike: An aliquot of a sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Method Blank: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

Method Detection Limit (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

Reportable Detection Limit (RDL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes the RDL analyte concentration is selected as the lowest non-zero standard in the calibration curve. While the RDL is approximately 5 to 10 times the MDL, the RDL for each sample takes into account the sample volume/weight, extract/digestate volume, cleanup procedures and, if applicable, dry weight correction. Sample RDLs are highly matrix-dependent.

Surrogate: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. These compounds are spiked into all blanks, standards, and samples prior to analysis. Percent recoveries are calculated for each surrogate.

Continuing Calibration Verification: The calibration relationship established during the initial calibration must be verified at periodic intervals. Concentrations, intervals, and criteria are method specific.

Validated by:
June O'Connor
Rebecca Merz

The following outlines the condition of all EPH samples contained within this report upon laboratory receipt.

Matrices	Ground Water		
Containers	✓ Satisfactory		
Aqueous Preservative	N/A	✓ pH \leq 2	pH>2 pH adjusted to <2 in lab
Temperature	✓ Received on ice	Received at 4 \pm 2 °C	✓ Other: 1.2°C

Were all QA/QC procedures followed as required by the EPH method? *Yes*

Were any significant modifications made to the EPH method as specified in Section 11.3? *No*

Were all performance/acceptance standards for required QA/QC procedures achieved? *Yes*


I attest that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

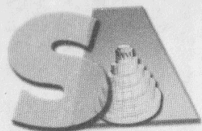
Authorized by:



Nicole Leja
Laboratory Director

MassDEP Analytical Protocol Certification Form

Laboratory Name: Spectrum Analytical, Inc.			Project #: 11-1395		
Project Location: TSC-Volpe Center - Cambridge, MA			RTN:		
This form provides certifications for the following data set:			SB25934-01 through SB25934-09		
Matrices: Ground Water					
CAM Protocol					
✓	8260 VOC CAM II A	7470/7471 Hg CAM III B	MassDEP VPH CAM IV A	8081 Pesticides CAM V B	7196 Hex Cr CAM VI B
	8270 SVOC CAM II B	7010 Metals CAM III C	✓ MassDEP EPH CAM IV B	8151 Herbicides CAM V C	8330 Explosives CAM VIII A
	6010 Metals CAM III A	6020 Metals CAM III D	8082 PCB CAM V A	9014 Total Cyanide/PAC CAM VI A	6860 Perchlorate CAM VIII B
Affirmative responses to questions A through F are required for "Presumptive Certainty" status					
A	Were all samples received in a condition consistent with those described on the Chain of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?				✓ Yes No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?				✓ Yes No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?				✓ Yes No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?				✓ Yes No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?				✓ Yes No Yes No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to questions A through E)?				✓ Yes No
Responses to questions G, H and I below are required for "Presumptive Certainty" status					
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?				Yes ✓ No
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.					
H	Were all QC performance standards specified in the CAM protocol(s) achieved?				Yes ✓ No
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?				✓ Yes No
All negative responses are addressed in a case narrative on the cover page of this report.					
<p><i>I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.</i></p> <div style="text-align: right; margin-top: 20px;">  Nicole Leja Laboratory Director Date: 3/25/2011 </div>					



SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:

- ☐ Standard TAT - 7 to 10 business days
☒ Rush TAT - Date Needed: 5 Day
All TATs subject to laboratory approval.
Min. 24-hour notification needed for rushes.
Samples disposed of after 60 days unless otherwise instructed.

Report To:

FS Engineers, Inc.
2 Clock Tower Place, Suite 630
Maynard, MA 01754

Telephone #: (978) 298-5956

Project Mgr. Farooq Siddique

Invoice To:

FS Engineers

Project No.:

11-1395

Site Name:

TSC-Volpe Center

Location:

Cambridge

State: MA

Sampler(s):

P. Buxemi

P.O. No.:

RQN:

List preservative code below:

2 2

QA/QC Reporting Notes:

* additional charges may apply

MA DEP MCP CAM Report: Yes ☒ No ☐
CT DPH RCP Report: Yes ☐ No ☐

QA/QC Reporting Level

☐ Standard ☐ No QC ☐ DQA*
☐ NY ASP A* ☐ NY ASP B*
☐ NJ Reduced* ☐ NJ Full*
☐ TIER II* ☐ TIER V*

☒ Other GW-1

State-specific reporting standards:

* VOCs 8260: Full LIST

1=Na₂S₂O₃ 2=HCl 3=H₂SO₄ 4=HNO₃ 5=NaOH 6=Ascorbic Acid 7=CH₃OH
8=NaHSO₄ 9=Deionized Water 10=

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air
X1= X2= X3=

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	VOCs via 8260*	MA EPH
25934-01	MW-1-031711	03/17/11	1133	G	GW	3	2			X	X
-02	MW-3-031711	↑	1231	G	GW	3	2			X	X
-03	MW-4-031711		1433	G	GW	3	2			X	X
-04	MW-5-031711		1333	G	GW	3	2			X	X
-05	MW-6-031711		0903	G	GW	3	2			X	X
-06	MW-7-031711		1536	G	GW	3	2			X	X
-07	MW-8-031711		1014	G	GW	3	2			X	X
-08	MW-9-031711	↓	1646	G	GW	3	2			X	X
09	FD-1-031711	03/17/11	1403	G	GW	3				X	

Relinquished by:

Received by:

Date:

Time:

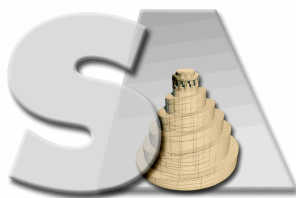
Temp°C

☐ EDD Format

☐ E-mail to

☐ Ambient ☒ Iced ☐ Refrigerated ☐ Fridge temp °C ☐ Freezer temp °C

Report Date:
27-Apr-11 16:25



- ☒ Final Report
☐ Re-Issued Report
☐ Revised Report

SPECTRUM ANALYTICAL, INC.

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HANIBAL TECHNOLOGY

Laboratory Report

FS Engineers, Inc.
2 Clock Tower Place, Suite 630
Maynard, MA 01754
Attn: Farooq Siddique

Project: TSC Playground - Cambridge, MA
Project #: 11-1401

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>Date Received</u>
SB27555-01	Stockpile 01	Soil	25-Apr-11 11:45	25-Apr-11 16:45

I attest that the information contained within the report has been reviewed for accuracy and checked against the quality control requirements for each method. These results relate only to the sample(s) as received.
All applicable NELAC requirements have been met.

Massachusetts # M-MA138/MA1110
Connecticut # PH-0777
Florida # E87600/E87936
Maine # MA138
New Hampshire # 2538
New Jersey # MA011/MA012
New York # 11393/11840
Pennsylvania # 68-04426/68-02924
Rhode Island # 98
USDA # S-51435



Authorized by:

Nicole Leja
Laboratory Director

Spectrum Analytical holds certification in the State of Massachusetts for the analytes as indicated with an X in the "Cert." column within this report. Please note that the State of Massachusetts does not offer certification for all analytes.
Please note that this report contains 19 pages of analytical data plus Chain of Custody document(s). When the Laboratory Report is indicated as revised, this report supersedes any previously dated reports for the laboratory ID(s) referenced above. Where this report identifies subcontracted analyses, copies of the subcontractor's test report are available upon request. This report may not be reproduced, except in full, without written approval from Spectrum Analytical, Inc.

Spectrum Analytical, Inc. is a NELAC accredited laboratory organization and meets NELAC testing standards. Use of the NELAC logo however does not insure that Spectrum is currently accredited for the specific method or analyte indicated. Please refer to our "Quality" web page at www.spectrum-analytical.com for a full listing of our current certifications and fields of accreditation. States in which Spectrum Analytical, Inc. holds NELAC certification are New York, New Hampshire, New Jersey and Florida. All analytical work for Volatile Organic and Air analysis are transferred to and conducted at our 830 Silver Street location (NY-11840, FL-E87936 and NJ-MA012).

CASE NARRATIVE:

The sample temperature upon receipt by Spectrum Analytical courier was recorded as 5.1 degrees Celsius. The condition of these samples was further noted as received on ice. The samples were transported on ice to the laboratory facility and the temperature was recorded at 0.2 degrees Celsius upon receipt at the laboratory. Please refer to the Chain of Custody for details specific to sample receipt times.

An infrared thermometer with a tolerance of +/- 2.0 degrees Celsius was used immediately upon receipt of the samples.

If a Matrix Spike (MS), Matrix Spike Duplicate (MSD) or Duplicate (DUP) was not requested on the Chain of Custody, method criteria may have been fulfilled with a source sample not of this Sample Delivery Group.

MADEP has published a list of analytical methods (CAM) which provides a series of recommended protocols for the acquisition, analysis and reporting of analytical data in support of MCP decisions. "Presumptive Certainty" can be established only for those methods published by the MADEP in the MCP CAM. The compounds and/or elements reported were specifically requested by the client on the Chain of Custody and in some cases may not include the full analyte list as defined in the method. Regulatory limits may not be achieved if specific method and/or technique was not requested on the Chain of Custody.

According to WSC-CAM 5/2009 Rev.1, Table 11 A-1, recovery for some VOC analytes have been deemed potentially difficult. Although they may still be within the recommended recovery range, a range has been set based on historical control limits.

These samples do not exhibit the characteristics of reactivity as defined in 40 CFR 261.23, sections (1), (2), (4), and (5); however, Spectrum Analytical, Inc. does not test for detonation, explosive reaction or potential, or forbidden explosives as defined in 40 CFR 261.23, sections (3), (6), (7) and (8).

Some target analytes which are not listed as exceptions in the Summary of CAM Reporting Limits may exceed the recommended RL based on sample initial volume or weight provided, % moisture content, or responsiveness of a particular analyte to purge and trap instrumentation.

See below for any non-conformances and issues relating to quality control samples and/or sample analysis/matrix.

+SW846 8100Mod.

Samples:

SB27555-01 *Stockpile 01*

The Reporting Limit has been raised to account for matrix interference.

SW846 8270D

Calibration:

1102006

Analyte quantified by quadratic equation type calibration.

Benzidine
Carbazole

This affected the following samples:

S100871-ICV1

S100871-ICV1

Analyte percent recovery is outside individual acceptance criteria (70-130).

Carbazole (151%)

Calibration:

S100871-ICV1

This affected the following samples:

1107444-BLK1
1107444-BS1
S103491-CCV1
Stockpile 01

Laboratory Control Samples:

1107444 BS

Benidine percent recovery 32 (40-140) is outside individual acceptance criteria, but within overall method allowances. All reported results of the following samples are considered to have a potentially low bias:

Stockpile 01

Benzoic acid percent recovery 15 (40-130) is outside individual acceptance criteria, but within overall method allowances. All reported results of the following samples are considered to have a potentially low bias:

Stockpile 01

Carbazole percent recovery 141 (40-130) is outside individual acceptance criteria, but within overall method allowances. All reported results of the following samples are considered to have a potentially high bias:

Stockpile 01

Pentachlorophenol percent recovery 37 (40-130) is outside individual acceptance criteria, but within overall method allowances. All reported results of the following samples are considered to have a potentially low bias:

Stockpile 01

Pyridine percent recovery 38 (40-140) is outside individual acceptance criteria, but within overall method allowances. All reported results of the following samples are considered to have a potentially low bias:

Stockpile 01

Samples:

S103491-CCV1

Analyte percent difference is outside individual acceptance criteria (20), but within overall method allowances.

3,3'-Dichlorobenzidine (59.0%)
3-Nitroaniline (28.6%)
4-Nitrophenol (-22.3%)
Diethyl phthalate (21.1%)
Di-n-butyl phthalate (26.6%)
Di-n-octyl phthalate (39.4%)
Fluorene (27.6%)
Hexachloroethane (22.6%)
N-Nitrosodiphenylamine (38.7%)
Pentachloronitrobenzene (50.4%)
Pentachlorophenol (-53.8%)
Pyridine (-33.0%)

Analyte percent drift is outside individual acceptance criteria (20), but within overall method allowances.

4,6-Dinitro-2-methylphenol (47.5%)
Carbazole (62.5%)

SW846 8270D

Samples:

S103491-CCV1

This affected the following samples:

1107444-BLK1

1107444-BS1

Stockpile 01

SB27555-01

Stockpile 01

The Reporting Limit has been raised to account for matrix interference.

Sample Identification**Stockpile 01**

SB27555-01

Client Project #

11-1401

Matrix

Soil

Collection Date/Time

25-Apr-11 11:45

Received

25-Apr-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Semivolatile Organic Compounds by GCMS												
<u>Semivolatile Organic Compounds by SW846 8270C</u>												
<u>Prepared by method SW846 3545A</u>												
83-32-9	Acenaphthene	BRL		µg/kg dry	1760	5	SW846 8270D	26-Apr-11	27-Apr-11	ML	1107444	
208-96-8	Acenaphthylene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
62-53-3	Aniline	BRL		µg/kg dry	3520	5	"	"	"	"	"	
120-12-7	Anthracene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
103-33-3	Azobenzene/Diphenyldiazine	BRL		µg/kg dry	3520	5	"	"	"	"	"	
92-87-5	Benzidine	BRL		µg/kg dry	3520	5	"	"	"	"	"	
56-55-3	Benzo (a) anthracene	2,000		µg/kg dry	1760	5	"	"	"	"	"	
50-32-8	Benzo (a) pyrene	2,090		µg/kg dry	1760	5	"	"	"	"	"	
205-99-2	Benzo (b) fluoranthene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
191-24-2	Benzo (g,h,i) perylene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
207-08-9	Benzo (k) fluoranthene	2,410		µg/kg dry	1760	5	"	"	"	"	"	
65-85-0	Benzoic acid	BRL		µg/kg dry	3520	5	"	"	"	"	"	
100-51-6	Benzyl alcohol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
111-91-1	Bis(2-chloroethoxy)methane	BRL		µg/kg dry	3520	5	"	"	"	"	"	
111-44-4	Bis(2-chloroethyl)ether	BRL		µg/kg dry	1760	5	"	"	"	"	"	
108-60-1	Bis(2-chloroisopropyl)ether	BRL		µg/kg dry	1760	5	"	"	"	"	"	
117-81-7	Bis(2-ethylhexyl)phthalate	BRL		µg/kg dry	1760	5	"	"	"	"	"	
101-55-3	4-Bromophenyl phenyl ether	BRL		µg/kg dry	3520	5	"	"	"	"	"	
85-68-7	Butyl benzyl phthalate	BRL		µg/kg dry	3520	5	"	"	"	"	"	
86-74-8	Carbazole	BRL		µg/kg dry	1760	5	"	"	"	"	"	
59-50-7	4-Chloro-3-methylphenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
106-47-8	4-Chloroaniline	BRL		µg/kg dry	1760	5	"	"	"	"	"	
91-58-7	2-Chloronaphthalene	BRL		µg/kg dry	3520	5	"	"	"	"	"	
95-57-8	2-Chlorophenol	BRL		µg/kg dry	1760	5	"	"	"	"	"	
7005-72-3	4-Chlorophenyl phenyl ether	BRL		µg/kg dry	3520	5	"	"	"	"	"	
218-01-9	Chrysene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
53-70-3	Dibenzo (a,h) anthracene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
132-64-9	Dibenzofuran	BRL		µg/kg dry	1760	5	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/kg dry	3520	5	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/kg dry	3520	5	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/kg dry	3520	5	"	"	"	"	"	
91-94-1	3,3'-Dichlorobenzidine	BRL		µg/kg dry	3520	5	"	"	"	"	"	
120-83-2	2,4-Dichlorophenol	BRL		µg/kg dry	1760	5	"	"	"	"	"	
84-66-2	Diethyl phthalate	BRL		µg/kg dry	3520	5	"	"	"	"	"	
131-11-3	Dimethyl phthalate	BRL		µg/kg dry	3520	5	"	"	"	"	"	
105-67-9	2,4-Dimethylphenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
84-74-2	Di-n-butyl phthalate	BRL		µg/kg dry	3520	5	"	"	"	"	"	
534-52-1	4,6-Dinitro-2-methylphenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
51-28-5	2,4-Dinitrophenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
121-14-2	2,4-Dinitrotoluene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
606-20-2	2,6-Dinitrotoluene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
117-84-0	Di-n-octyl phthalate	BRL		µg/kg dry	3520	5	"	"	"	"	"	
206-44-0	Fluoranthene	3,480		µg/kg dry	1760	5	"	"	"	"	"	
86-73-7	Fluorene	BRL		µg/kg dry	1760	5	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification**Stockpile 01**

SB27555-01

Client Project #

11-1401

Matrix

Soil

Collection Date/Time

25-Apr-11 11:45

Received

25-Apr-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Semivolatile Organic Compounds by GCMSSemivolatile Organic Compounds by SW846 8270C

R01

Prepared by method SW846 3545A

118-74-1	Hexachlorobenzene	BRL		µg/kg dry	1760	5	SW846 8270D	26-Apr-11	27-Apr-11	ML	1107444	
87-68-3	Hexachlorobutadiene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
77-47-4	Hexachlorocyclopentadiene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
67-72-1	Hexachloroethane	BRL		µg/kg dry	1760	5	"	"	"	"	"	
193-39-5	Indeno (1,2,3-cd) pyrene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
90-12-0	1-Methylnaphthalene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
78-59-1	Isophorone	BRL		µg/kg dry	1760	5	"	"	"	"	"	
91-57-6	2-Methylnaphthalene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
95-48-7	2-Methylphenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
108-39-4, 106-44-5	3 & 4-Methylphenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
91-20-3	Naphthalene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
88-74-4	2-Nitroaniline	BRL		µg/kg dry	3520	5	"	"	"	"	"	
99-09-2	3-Nitroaniline	BRL		µg/kg dry	3520	5	"	"	"	"	"	
100-01-6	4-Nitroaniline	BRL		µg/kg dry	1760	5	"	"	"	"	"	
98-95-3	Nitrobenzene	BRL		µg/kg dry	1760	5	"	"	"	"	"	
88-75-5	2-Nitrophenol	BRL		µg/kg dry	1760	5	"	"	"	"	"	
100-02-7	4-Nitrophenol	BRL		µg/kg dry	14100	5	"	"	"	"	"	
62-75-9	N-Nitrosodimethylamine	BRL		µg/kg dry	1760	5	"	"	"	"	"	
621-64-7	N-Nitrosodi-n-propylamine	BRL		µg/kg dry	1760	5	"	"	"	"	"	
86-30-6	N-Nitrosodiphenylamine	BRL		µg/kg dry	3520	5	"	"	"	"	"	
87-86-5	Pentachlorophenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
85-01-8	Phenanthrene	2,110		µg/kg dry	1760	5	"	"	"	"	"	
108-95-2	Phenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
129-00-0	Pyrene	3,550		µg/kg dry	1760	5	"	"	"	"	"	
110-86-1	Pyridine	BRL		µg/kg dry	3520	5	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/kg dry	3520	5	"	"	"	"	"	
95-95-4	2,4,5-Trichlorophenol	BRL		µg/kg dry	3520	5	"	"	"	"	"	
88-06-2	2,4,6-Trichlorophenol	BRL		µg/kg dry	1760	5	"	"	"	"	"	
82-68-8	Pentachloronitrobenzene	BRL		µg/kg dry	3520	5	"	"	"	"	"	
95-94-3	1,2,4,5-Tetrachlorobenzene	BRL		µg/kg dry	3520	5	"	"	"	"	"	

Surrogate recoveries:

321-60-8	2-Fluorobiphenyl	90			30-130 %		"	"	"	"	"	
367-12-4	2-Fluorophenol	84			30-130 %		"	"	"	"	"	
4165-60-0	Nitrobenzene-d5	88			30-130 %		"	"	"	"	"	
4165-62-2	Phenol-d5	88			30-130 %		"	"	"	"	"	
1718-51-0	Terphenyl-d14	68			30-130 %		"	"	"	"	"	
118-79-6	2,4,6-Tribromophenol	60			30-130 %		"	"	"	"	"	

Semivolatile Organic Compounds by GCPolychlorinated Biphenyls by SW846 8082Prepared by method SW846 3545A

12674-11-2	Aroclor-1016	BRL		µg/kg dry	20.3	1	SW846 8082A	26-Apr-11	27-Apr-11	IMR	1107445	
11104-28-2	Aroclor-1221	BRL		µg/kg dry	20.3	1	"	"	"	"	"	
11141-16-5	Aroclor-1232	BRL		µg/kg dry	20.3	1	"	"	"	"	"	
53469-21-9	Aroclor-1242	BRL		µg/kg dry	20.3	1	"	"	"	"	"	

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Sample Identification**Stockpile 01**

SB27555-01

Client Project #

11-1401

Matrix

Soil

Collection Date/Time

25-Apr-11 11:45

Received

25-Apr-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Semivolatile Organic Compounds by GCPolychlorinated Biphenyls by SW846 8082Prepared by method SW846 3545A

12672-29-6	Aroclor-1248	BRL		µg/kg dry	20.3	1	SW846 8082A	26-Apr-11	27-Apr-11	IMR	1107445	
11097-69-1	Aroclor-1254	105		µg/kg dry	20.3	1	"	"	"	"	"	
11096-82-5	Aroclor-1260	24.2		µg/kg dry	20.3	1	"	"	"	"	"	
37324-23-5	Aroclor-1262	BRL		µg/kg dry	20.3	1	"	"	"	"	"	
11100-14-4	Aroclor-1268	BRL		µg/kg dry	20.3	1	"	"	"	"	"	

Surrogate recoveries:

10386-84-2	4,4-DB-Octafluorobiphenyl (Sr)	70			30-150 %		"	"	"	"	"	
10386-84-2	4,4-DB-Octafluorobiphenyl (Sr) [2C]	96			30-150 %		"	"	"	"	"	
2051-24-3	Decachlorobiphenyl (Sr)	116			30-150 %		"	"	"	"	"	
2051-24-3	Decachlorobiphenyl (Sr) [2C]	87			30-150 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsTPH 8100 by GC

R01

Prepared by method SW846 3545A

8006-61-9	Gasoline	BRL		mg/kg dry	14.2	1	+SW846 8100Mod.	26-Apr-11	26-Apr-11	SHM	1107443	
68476-30-2	Fuel Oil #2	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
68476-31-3	Fuel Oil #4	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
68553-00-4	Fuel Oil #6	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
M09800000	Motor Oil	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
8032-32-4	Ligroin	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
J00100000	Aviation Fuel	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
	Hydraulic Oil	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
	Dielectric Fluid	BRL		mg/kg dry	14.2	1	"	"	"	"	"	
	Unidentified	211		mg/kg dry	14.2	1	"	"	"	"	"	
	Other Oil	Calculated as		mg/kg dry	14.2	1	"	"	"	"	"	
	Total Petroleum Hydrocarbons	211		mg/kg dry	14.2	1	"	"	"	"	"	

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	50			40-140 %		"	"	"	"	"	
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TCLP Metals by EPA 1311 & 6000/7000 Series Methods

	TCLP Extraction	Completed		N/A		1	SW846 1311	25-Apr-11	26-Apr-11	AMT	1107417	
7439-92-1	Lead	0.234		mg/l	0.0150	1	SW846 1311/6010C	26-Apr-11	27-Apr-11	LR	1107488	

General Chemistry Parameters

	% Solids	93.1		%		1	SM2540 G Mod.	26-Apr-11	26-Apr-11	BD	1107470	
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Toxicity Characteristics

	Flashpoint	>200		°F		1	SW846 1010	27-Apr-11	27-Apr-11	VK	1107605	
	pH	6.62	pH	pH Units		1	SW846 9045C	27-Apr-11 10:19	27-Apr-11 12:52	BD	1107575	

Reactivity Cyanide/SulfidePrepared by method General Preparation

	Reactivity	Nonreactive		mg/kg dry		1	SW846 Ch. 7.3	27-Apr-11	27-Apr-11	BD	1107596	
	Reactive Cyanide	BRL		mg/kg dry	24.5	1	"	"	"	"	"	
	Reactive Sulfide	BRL		mg/kg dry	49.1	1	"	"	"	"	"	

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Semivolatile Organic Compounds by GCMS - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107444 - SW846 3545A										
<u>Blank (1107444-BLK1)</u>										<u>Prepared: 26-Apr-11 Analyzed: 27-Apr-11</u>
Acenaphthene	BRL		µg/kg wet	165						
Acenaphthylene	BRL		µg/kg wet	165						
Aniline	BRL		µg/kg wet	330						
Anthracene	BRL		µg/kg wet	165						
Azobenzene/Diphenyldiazine	BRL		µg/kg wet	330						
Benzidine	BRL		µg/kg wet	330						
Benzo (a) anthracene	BRL		µg/kg wet	165						
Benzo (a) pyrene	BRL		µg/kg wet	165						
Benzo (b) fluoranthene	BRL		µg/kg wet	165						
Benzo (g,h,i) perylene	BRL		µg/kg wet	165						
Benzo (k) fluoranthene	BRL		µg/kg wet	165						
Benzoic acid	BRL		µg/kg wet	330						
Benzyl alcohol	BRL		µg/kg wet	330						
Bis(2-chloroethoxy)methane	BRL		µg/kg wet	330						
Bis(2-chloroethyl)ether	BRL		µg/kg wet	165						
Bis(2-chloroisopropyl)ether	BRL		µg/kg wet	165						
Bis(2-ethylhexyl)phthalate	BRL		µg/kg wet	165						
4-Bromophenyl phenyl ether	BRL		µg/kg wet	330						
Butyl benzyl phthalate	BRL		µg/kg wet	330						
Carbazole	BRL		µg/kg wet	165						
4-Chloro-3-methylphenol	BRL		µg/kg wet	330						
4-Chloroaniline	BRL		µg/kg wet	165						
2-Chloronaphthalene	BRL		µg/kg wet	330						
2-Chlorophenol	BRL		µg/kg wet	165						
4-Chlorophenyl phenyl ether	BRL		µg/kg wet	330						
Chrysene	BRL		µg/kg wet	165						
Dibenzo (a,h) anthracene	BRL		µg/kg wet	165						
Dibenzofuran	BRL		µg/kg wet	165						
1,2-Dichlorobenzene	BRL		µg/kg wet	330						
1,3-Dichlorobenzene	BRL		µg/kg wet	330						
1,4-Dichlorobenzene	BRL		µg/kg wet	330						
3,3'-Dichlorobenzidine	BRL		µg/kg wet	330						
2,4-Dichlorophenol	BRL		µg/kg wet	165						
Diethyl phthalate	BRL		µg/kg wet	330						
Dimethyl phthalate	BRL		µg/kg wet	330						
2,4-Dimethylphenol	BRL		µg/kg wet	330						
Di-n-butyl phthalate	BRL		µg/kg wet	330						
4,6-Dinitro-2-methylphenol	BRL		µg/kg wet	330						
2,4-Dinitrophenol	BRL		µg/kg wet	330						
2,4-Dinitrotoluene	BRL		µg/kg wet	165						
2,6-Dinitrotoluene	BRL		µg/kg wet	165						
Di-n-octyl phthalate	BRL		µg/kg wet	330						
Fluoranthene	BRL		µg/kg wet	165						
Fluorene	BRL		µg/kg wet	165						
Hexachlorobenzene	BRL		µg/kg wet	165						
Hexachlorobutadiene	BRL		µg/kg wet	165						
Hexachlorocyclopentadiene	BRL		µg/kg wet	165						
Hexachloroethane	BRL		µg/kg wet	165						
Indeno (1,2,3-cd) pyrene	BRL		µg/kg wet	165						
1-Methylnaphthalene	BRL		µg/kg wet	165						
Isophorone	BRL		µg/kg wet	165						
2-Methylnaphthalene	BRL		µg/kg wet	165						

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* Reportable Detection Limit

BRL = Below Reporting Limit

Semivolatile Organic Compounds by GCMS - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107444 - SW846 3545A										
<u>Blank (1107444-BLK1)</u>	<u>Prepared: 26-Apr-11 Analyzed: 27-Apr-11</u>									
2-Methylphenol	BRL		µg/kg wet	330						
3 & 4-Methylphenol	BRL		µg/kg wet	330						
Naphthalene	BRL		µg/kg wet	165						
2-Nitroaniline	BRL		µg/kg wet	330						
3-Nitroaniline	BRL		µg/kg wet	330						
4-Nitroaniline	BRL		µg/kg wet	165						
Nitrobenzene	BRL		µg/kg wet	165						
2-Nitrophenol	BRL		µg/kg wet	165						
4-Nitrophenol	BRL		µg/kg wet	1320						
N-Nitrosodimethylamine	BRL		µg/kg wet	165						
N-Nitrosodi-n-propylamine	BRL		µg/kg wet	165						
N-Nitrosodiphenylamine	BRL		µg/kg wet	330						
Pentachlorophenol	BRL		µg/kg wet	330						
Phenanthrene	BRL		µg/kg wet	165						
Phenol	BRL		µg/kg wet	330						
Pyrene	BRL		µg/kg wet	165						
Pyridine	BRL		µg/kg wet	330						
1,2,4-Trichlorobenzene	BRL		µg/kg wet	330						
2,4,5-Trichlorophenol	BRL		µg/kg wet	330						
2,4,6-Trichlorophenol	BRL		µg/kg wet	165						
Pentachloronitrobenzene	BRL		µg/kg wet	330						
1,2,4,5-Tetrachlorobenzene	BRL		µg/kg wet	330						
<i>Surrogate: 2-Fluorobiphenyl</i>	<i>1360</i>		<i>µg/kg wet</i>		<i>1670</i>		<i>81</i>	<i>30-130</i>		
<i>Surrogate: 2-Fluorophenol</i>	<i>1290</i>		<i>µg/kg wet</i>		<i>1670</i>		<i>77</i>	<i>30-130</i>		
<i>Surrogate: Nitrobenzene-d5</i>	<i>1320</i>		<i>µg/kg wet</i>		<i>1670</i>		<i>79</i>	<i>30-130</i>		
<i>Surrogate: Phenol-d5</i>	<i>1320</i>		<i>µg/kg wet</i>		<i>1670</i>		<i>79</i>	<i>30-130</i>		
<i>Surrogate: Terphenyl-dl4</i>	<i>1210</i>		<i>µg/kg wet</i>		<i>1670</i>		<i>73</i>	<i>30-130</i>		
<i>Surrogate: 2,4,6-Tribromophenol</i>	<i>1020</i>		<i>µg/kg wet</i>		<i>1670</i>		<i>61</i>	<i>30-130</i>		
<u>LCS (1107444-BS1)</u>	<u>Prepared: 26-Apr-11 Analyzed: 27-Apr-11</u>									
Acenaphthene	1380		µg/kg wet	165	1670		83	40-130		
Acenaphthylene	1410		µg/kg wet	165	1670		85	40-130		
Aniline	1360		µg/kg wet	330	1670		82	40-130		
Anthracene	1540		µg/kg wet	165	1670		93	40-130		
Azobenzene/Diphenyldiazine	1850		µg/kg wet	330	1670		111	40-130		
Benzidine	533	QC2	µg/kg wet	330	1670		32	40-140		
Benzo (a) anthracene	1650		µg/kg wet	165	1670		99	40-130		
Benzo (a) pyrene	1420		µg/kg wet	165	1670		85	40-130		
Benzo (b) fluoranthene	1320		µg/kg wet	165	1670		79	40-130		
Benzo (g,h,i) perylene	1190		µg/kg wet	165	1670		72	40-130		
Benzo (k) fluoranthene	1540		µg/kg wet	165	1670		93	40-130		
Benzoic acid	250	QC2	µg/kg wet	330	1670		15	40-130		
Benzyl alcohol	1360		µg/kg wet	330	1670		82	40-130		
Bis(2-chloroethoxy)methane	1120		µg/kg wet	330	1670		67	40-130		
Bis(2-chloroethyl)ether	1100		µg/kg wet	165	1670		66	40-130		
Bis(2-chloroisopropyl)ether	1290		µg/kg wet	165	1670		78	40-130		
Bis(2-ethylhexyl)phthalate	1530		µg/kg wet	165	1670		92	40-130		
4-Bromophenyl phenyl ether	1280		µg/kg wet	330	1670		77	40-130		
Butyl benzyl phthalate	1440		µg/kg wet	330	1670		86	40-130		
Carbazole	2350	QC2	µg/kg wet	165	1670		141	40-130		
4-Chloro-3-methylphenol	1330		µg/kg wet	330	1670		80	40-130		
4-Chloroaniline	1200		µg/kg wet	165	1670		72	40-130		

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* Reportable Detection Limit

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Semivolatile Organic Compounds by GCMS - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107444 - SW846 3545A										
<u>LCS (1107444-BS1)</u>	<u>Prepared: 26-Apr-11 Analyzed: 27-Apr-11</u>									
2-Chloronaphthalene	1300		µg/kg wet	330	1670		78	40-130		
2-Chlorophenol	1280		µg/kg wet	165	1670		77	40-130		
4-Chlorophenyl phenyl ether	1380		µg/kg wet	330	1670		83	40-130		
Chrysene	1320		µg/kg wet	165	1670		79	40-130		
Dibenzo (a,h) anthracene	1360		µg/kg wet	165	1670		82	40-130		
Dibenzofuran	1400		µg/kg wet	165	1670		84	40-130		
1,2-Dichlorobenzene	1460		µg/kg wet	330	1670		88	40-130		
1,3-Dichlorobenzene	1200		µg/kg wet	330	1670		72	40-130		
1,4-Dichlorobenzene	1310		µg/kg wet	330	1670		78	40-130		
3,3'-Dichlorobenzidine	1900		µg/kg wet	330	1670		114	40-130		
2,4-Dichlorophenol	1310		µg/kg wet	165	1670		79	40-130		
Diethyl phthalate	1470		µg/kg wet	330	1670		88	40-130		
Dimethyl phthalate	1290		µg/kg wet	330	1670		77	40-130		
2,4-Dimethylphenol	1120		µg/kg wet	330	1670		67	40-130		
Di-n-butyl phthalate	1660		µg/kg wet	330	1670		100	40-130		
4,6-Dinitro-2-methylphenol	1470		µg/kg wet	330	1670		88	40-130		
2,4-Dinitrophenol	736		µg/kg wet	330	1670		44	40-130		
2,4-Dinitrotoluene	1410		µg/kg wet	165	1670		85	40-130		
2,6-Dinitrotoluene	1200		µg/kg wet	165	1670		72	40-130		
Di-n-octyl phthalate	1680		µg/kg wet	330	1670		101	40-130		
Fluoranthene	1510		µg/kg wet	165	1670		90	40-130		
Fluorene	1580		µg/kg wet	165	1670		95	40-130		
Hexachlorobenzene	1280		µg/kg wet	165	1670		77	40-130		
Hexachlorobutadiene	1240		µg/kg wet	165	1670		75	40-130		
Hexachlorocyclopentadiene	990		µg/kg wet	165	1670		59	40-130		
Hexachloroethane	1520		µg/kg wet	165	1670		91	40-130		
Indeno (1,2,3-cd) pyrene	1290		µg/kg wet	165	1670		78	40-130		
1-Methylnaphthalene	1410		µg/kg wet	165	1670		85	40-140		
Isophorone	1230		µg/kg wet	165	1670		74	40-130		
2-Methylnaphthalene	1340		µg/kg wet	165	1670		80	40-130		
2-Methylphenol	1290		µg/kg wet	330	1670		77	40-130		
3 & 4-Methylphenol	1340		µg/kg wet	330	1670		80	40-130		
Naphthalene	1350		µg/kg wet	165	1670		81	40-130		
2-Nitroaniline	1350		µg/kg wet	330	1670		81	40-130		
3-Nitroaniline	1220		µg/kg wet	330	1670		73	40-130		
4-Nitroaniline	1550		µg/kg wet	165	1670		93	40-130		
Nitrobenzene	1370		µg/kg wet	165	1670		82	40-130		
2-Nitrophenol	1220		µg/kg wet	165	1670		73	40-130		
4-Nitrophenol	979		µg/kg wet	1320	1670		59	40-130		
N-Nitrosodimethylamine	965		µg/kg wet	165	1670		58	40-130		
N-Nitrosodi-n-propylamine	1260		µg/kg wet	165	1670		76	40-130		
N-Nitrosodiphenylamine	1830		µg/kg wet	330	1670		110	40-130		
Pentachlorophenol	610	QC2	µg/kg wet	330	1670		37	40-130		
Phenanthrene	1470		µg/kg wet	165	1670		88	40-130		
Phenol	1140		µg/kg wet	330	1670		68	40-130		
Pyrene	1340		µg/kg wet	165	1670		80	40-130		
Pyridine	628	QC2	µg/kg wet	330	1670		38	40-140		
1,2,4-Trichlorobenzene	1190		µg/kg wet	330	1670		72	40-130		
2,4,5-Trichlorophenol	1230		µg/kg wet	330	1670		74	40-130		
2,4,6-Trichlorophenol	1400		µg/kg wet	165	1670		84	40-130		
Pentachloronitrobenzene	1870		µg/kg wet	330	1670		112	40-140		
1,2,4,5-Tetrachlorobenzene	1370		µg/kg wet	330	1670		82	40-140		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Semivolatile Organic Compounds by GCMS - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107444 - SW846 3545A										
<u>LCS (1107444-BS1)</u>					<u>Prepared: 26-Apr-11 Analyzed: 27-Apr-11</u>					
Surrogate: 2-Fluorobiphenyl	1470		µg/kg wet		1670		88	30-130		
Surrogate: 2-Fluorophenol	1380		µg/kg wet		1670		83	30-130		
Surrogate: Nitrobenzene-d5	1470		µg/kg wet		1670		88	30-130		
Surrogate: Phenol-d5	1320		µg/kg wet		1670		79	30-130		
Surrogate: Terphenyl-dl4	1400		µg/kg wet		1670		84	30-130		
Surrogate: 2,4,6-Tribromophenol	1350		µg/kg wet		1670		81	30-130		

Semivolatile Organic Compounds by GC - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107445 - SW846 3545A										
<u>Blank (1107445-BLK1)</u>					<u>Prepared & Analyzed: 26-Apr-11</u>					
Aroclor-1016	BRL		µg/kg wet	20.0						
Aroclor-1016 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1221	BRL		µg/kg wet	20.0						
Aroclor-1221 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1232	BRL		µg/kg wet	20.0						
Aroclor-1232 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1242	BRL		µg/kg wet	20.0						
Aroclor-1242 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1248	BRL		µg/kg wet	20.0						
Aroclor-1248 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1254	BRL		µg/kg wet	20.0						
Aroclor-1254 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1260	BRL		µg/kg wet	20.0						
Aroclor-1260 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1262	BRL		µg/kg wet	20.0						
Aroclor-1262 [2C]	BRL		µg/kg wet	20.0						
Aroclor-1268	BRL		µg/kg wet	20.0						
Aroclor-1268 [2C]	BRL		µg/kg wet	20.0						
<i>Surrogate: 4,4-DB-Octafluorobiphenyl (Sr)</i>	21.0		µg/kg wet		20.0		105	30-150		
<i>Surrogate: 4,4-DB-Octafluorobiphenyl (Sr) [2C]</i>	23.1		µg/kg wet		20.0		116	30-150		
<i>Surrogate: Decachlorobiphenyl (Sr)</i>	19.8		µg/kg wet		20.0		99	30-150		
<i>Surrogate: Decachlorobiphenyl (Sr) [2C]</i>	17.6		µg/kg wet		20.0		88	30-150		
<u>LCS (1107445-BS1)</u>					<u>Prepared & Analyzed: 26-Apr-11</u>					
Aroclor-1016	221		µg/kg wet	20.0	250		89	50-140		
Aroclor-1016 [2C]	244		µg/kg wet	20.0	250		98	50-140		
Aroclor-1260	170		µg/kg wet	20.0	250		68	50-140		
Aroclor-1260 [2C]	169		µg/kg wet	20.0	250		67	50-140		
<i>Surrogate: 4,4-DB-Octafluorobiphenyl (Sr)</i>	18.7		µg/kg wet		20.0		94	30-150		
<i>Surrogate: 4,4-DB-Octafluorobiphenyl (Sr) [2C]</i>	20.8		µg/kg wet		20.0		104	30-150		
<i>Surrogate: Decachlorobiphenyl (Sr)</i>	16.0		µg/kg wet		20.0		80	30-150		
<i>Surrogate: Decachlorobiphenyl (Sr) [2C]</i>	17.3		µg/kg wet		20.0		86	30-150		
<u>LCS Dup (1107445-BSD1)</u>					<u>Prepared & Analyzed: 26-Apr-11</u>					
Aroclor-1016	215		µg/kg wet	20.0	250		86	50-140	3	30
Aroclor-1016 [2C]	225		µg/kg wet	20.0	250		90	50-140	8	30
Aroclor-1260	172		µg/kg wet	20.0	250		69	50-140	1	30
Aroclor-1260 [2C]	156		µg/kg wet	20.0	250		62	50-140	8	30
<i>Surrogate: 4,4-DB-Octafluorobiphenyl (Sr)</i>	18.0		µg/kg wet		20.0		90	30-150		
<i>Surrogate: 4,4-DB-Octafluorobiphenyl (Sr) [2C]</i>	19.0		µg/kg wet		20.0		95	30-150		
<i>Surrogate: Decachlorobiphenyl (Sr)</i>	15.0		µg/kg wet		20.0		75	30-150		
<i>Surrogate: Decachlorobiphenyl (Sr) [2C]</i>	14.8		µg/kg wet		20.0		74	30-150		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107443 - SW846 3545A										
<u>Blank (1107443-BLK1)</u>					<u>Prepared & Analyzed: 26-Apr-11</u>					
Gasoline	BRL		mg/kg wet	13.3						
Fuel Oil #2	BRL		mg/kg wet	13.3						
Fuel Oil #4	BRL		mg/kg wet	13.3						
Fuel Oil #6	BRL		mg/kg wet	13.3						
Motor Oil	BRL		mg/kg wet	13.3						
Ligroin	BRL		mg/kg wet	13.3						
Aviation Fuel	BRL		mg/kg wet	13.3						
Hydraulic Oil	BRL		mg/kg wet	13.3						
Dielectric Fluid	BRL		mg/kg wet	13.3						
Unidentified	BRL		mg/kg wet	13.3						
Other Oil	BRL		mg/kg wet	13.3						
Total Petroleum Hydrocarbons	BRL		mg/kg wet	13.3						
<i>Surrogate: 1-Chlorooctadecane</i>	2.85		mg/kg wet		3.33		86	40-140		
<u>LCS (1107443-BS1)</u>					<u>Prepared & Analyzed: 26-Apr-11</u>					
Fuel Oil #2	835		mg/kg wet	13.3	667		125	40-140		
<i>Surrogate: 1-Chlorooctadecane</i>	2.92		mg/kg wet		3.33		88	40-140		

TCLP Metals by EPA 1311 & 6000/7000 Series Methods - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107488 - SW846 3010A										
<u>Blank (1107488-BLK1)</u>										
Lead	BRL		mg/l	0.0150						
<u>LCS (1107488-BS1)</u>										
Lead	2.71		mg/l	0.0150	2.50		108	85-115		
<u>LCS Dup (1107488-BSD1)</u>										
Lead	2.71		mg/l	0.0150	2.50		108	85-115	0.1	20

General Chemistry Parameters - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107470 - General Preparation										
<u>Duplicate (1107470-DUP1)</u>			<u>Source: SB27555-01</u>			<u>Prepared & Analyzed: 26-Apr-11</u>				
% Solids	92.9		%			93.1			0.2	20

Toxicity Characteristics - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107575 - General Preparation										
<u>Reference (1107575-SRM1)</u>	<u>Prepared & Analyzed: 27-Apr-11</u>									
pH	5.97		pH Units		6.00		100	97.5-102.5		
<u>Reference (1107575-SRM2)</u>	<u>Prepared & Analyzed: 27-Apr-11</u>									
pH	5.53		pH Units		5.51		100	92-108		
Batch 1107596 - General Preparation										
<u>Blank (1107596-BLK1)</u>	<u>Prepared & Analyzed: 27-Apr-11</u>									
Reactivity	Nonreactive		mg/kg wet							
Reactive Cyanide	BRL		mg/kg wet	25.0						
Reactive Sulfide	BRL		mg/kg wet	50.0						
<u>Duplicate (1107596-DUP1)</u>	<u>Source: SB27555-01</u> <u>Prepared & Analyzed: 27-Apr-11</u>									
Reactivity	Nonreactive		mg/kg dry			Nonreactive				200
Reactive Cyanide	BRL		mg/kg dry	23.9		BRL				35
Reactive Sulfide	BRL		mg/kg dry	47.7		BRL				35
<u>Reference (1107596-SRM1)</u>	<u>Prepared & Analyzed: 27-Apr-11</u>									
Reactive Cyanide	BRL		mg/kg wet	25.0	100		0	0-200		
<u>Reference (1107596-SRM2)</u>	<u>Prepared & Analyzed: 27-Apr-11</u>									
Reactive Sulfide	76.1		mg/kg wet	50.0	6700		1	0-200		
Batch 1107605 - General Preparation										
<u>Reference (1107605-SRM1)</u>	<u>Prepared & Analyzed: 27-Apr-11</u>									
Flashpoint	80		°F		81.0		99	95-105		

Notes and Definitions

QC2	Analyte out of acceptance range in QC spike but no reportable concentration present in sample.
R01	The Reporting Limit has been raised to account for matrix interference.
BRL	Below Reporting Limit - Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
NR	Not Reported
RPD	Relative Percent Difference
pH	The method for pH does not stipulate a specific holding time other than to state that the samples should be analyzed as soon as possible. For aqueous samples the 40 CFR 136 specifies a holding time of 15 minutes from sampling to analysis. Therefore all aqueous pH samples not analyzed in the field are considered out of hold time at the time of sample receipt. All soil samples are analyzed as soon as possible after sample receipt.

A plus sign (+) in the Method Reference column indicates the method is not accredited by NELAC.

Interpretation of Total Petroleum Hydrocarbon Report

Petroleum identification is determined by comparing the GC fingerprint obtained from the sample with a library of GC fingerprints obtained from analyses of various petroleum products. Possible match categories are as follows:

- Gasoline - includes regular, unleaded, premium, etc.
- Fuel Oil #2 - includes home heating oil, #2 fuel oil, and diesel
- Fuel Oil #4 - includes #4 fuel oil
- Fuel Oil #6 - includes #6 fuel oil and bunker "C" oil
- Motor Oil - includes virgin and waste automobile oil
- Ligroin - includes mineral spirits, petroleum naphtha, vm&p naphtha
- Aviation Fuel - includes kerosene, Jet A and JP-4
- Other Oil - includes lubricating and cutting oil, and silicon oil

At times, the unidentified petroleum product is quantified using a calibration that most closely approximates the distribution of compounds in the sample. When this occurs, the result is qualified as *TPH (Calculated as).

Laboratory Control Sample (LCS): A known matrix spiked with compound(s) representative of the target analytes, which is used to document laboratory performance.

Matrix Duplicate: An intra-laboratory split sample which is used to document the precision of a method in a given sample matrix.

Matrix Spike: An aliquot of a sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Method Blank: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

Method Detection Limit (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.


Reportable Detection Limit (RDL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes the RDL analyte concentration is selected as the lowest non-zero standard in the calibration curve. While the RDL is approximately 5 to 10 times the MDL, the RDL for each sample takes into account the sample volume/weight, extract/digestate volume, cleanup procedures and, if applicable, dry weight correction. Sample RDLs are highly matrix-dependent.

Surrogate: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. These compounds are spiked into all blanks, standards, and samples prior to analysis. Percent recoveries are calculated for each surrogate.

Continuing Calibration Verification: The calibration relationship established during the initial calibration must be verified at periodic intervals. Concentrations, intervals, and criteria are method specific.

Validated by:
Rebecca Merz

MassDEP Analytical Protocol Certification Form

Laboratory Name: Spectrum Analytical, Inc.			Project #: 11-1401		
Project Location: TSC Playground - Cambridge, MA			RTN:		
This form provides certifications for the following data set:			SB27555-01		
Matrices: Soil					
CAM Protocol					
8260 VOC CAM II A	7470/7471 Hg CAM III B	MassDEP VPH CAM IV A	8081 Pesticides CAM V B	7196 Hex Cr CAM VI B	MassDEP APH CAM IX A
✓ 8270 SVOC CAM II B	7010 Metals CAM III C	MassDEP EPH CAM IV B	8151 Herbicides CAM V C	8330 Explosives CAM VIII A	TO-15 VOC CAM IX B
✓ 6010 Metals CAM III A	6020 Metals CAM III D	✓ 8082 PCB CAM V A	9014 Total Cyanide/PAC CAM VI A	6860 Perchlorate CAM VIII B	
Affirmative responses to questions A through F are required for "Presumptive Certainty" status					
A	Were all samples received in a condition consistent with those described on the Chain of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?				✓ Yes No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?				✓ Yes No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?				✓ Yes No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?				✓ Yes No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?				Yes No Yes No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to questions A through E)?				✓ Yes No
Responses to questions G, H and I below are required for "Presumptive Certainty" status					
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?				Yes ✓ No
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.					
H	Were all QC performance standards specified in the CAM protocol(s) achieved?				Yes ✓ No
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?				Yes ✓ No
All negative responses are addressed in a case narrative on the cover page of this report.					
<p><i>I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.</i></p> <div style="text-align: right; margin-top: 20px;">  Nicole Leja Laboratory Director Date: 4/27/2011 </div>					

Report Date:
05-May-11 16:32



- ☒ Final Report
☐ Re-Issued Report
☐ Revised Report

SPECTRUM ANALYTICAL, INC.

Featuring

HANIBAL TECHNOLOGY

Laboratory Report

FS Engineers, Inc.
2 Clock Tower Place, Suite 630
Maynard, MA 01754
Attn: Farooq Siddique

Project: TSC-Volpe Center - Cambridge, MA
Project #: 11-1401

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>Date Received</u>
SB27755-01	CSB-01-042611	Soil	26-Apr-11 13:25	27-Apr-11 16:40
SB27755-02	CSB-02-042611	Soil	26-Apr-11 13:40	27-Apr-11 16:40

I attest that the information contained within the report has been reviewed for accuracy and checked against the quality control requirements for each method. These results relate only to the sample(s) as received.
All applicable NELAC requirements have been met.

Massachusetts # M-MA138/MA1110
Connecticut # PH-0777
Florida # E87600/E87936
Maine # MA138
New Hampshire # 2538
New Jersey # MA011/MA012
New York # 11393/11840
Pennsylvania # 68-04426/68-02924
Rhode Island # 98
USDA # S-51435



Authorized by:

Nicole Leja
Laboratory Director

Spectrum Analytical holds certification in the State of Massachusetts for the analytes as indicated with an X in the "Cert." column within this report. Please note that the State of Massachusetts does not offer certification for all analytes.
Please note that this report contains 18 pages of analytical data plus Chain of Custody document(s). When the Laboratory Report is indicated as revised, this report supersedes any previously dated reports for the laboratory ID(s) referenced above. Where this report identifies subcontracted analyses, copies of the subcontractor's test report are available upon request. This report may not be reproduced, except in full, without written approval from Spectrum Analytical, Inc.

Spectrum Analytical, Inc. is a NELAC accredited laboratory organization and meets NELAC testing standards. Use of the NELAC logo however does not insure that Spectrum is currently accredited for the specific method or analyte indicated. Please refer to our "Quality" web page at www.spectrum-analytical.com for a full listing of our current certifications and fields of accreditation. States in which Spectrum Analytical, Inc. holds NELAC certification are New York, New Hampshire, New Jersey and Florida. All analytical work for Volatile Organic and Air analysis are transferred to and conducted at our 830 Silver Street location (NY-11840, FL-E87936 and NJ-MA012).

CASE NARRATIVE:

The sample temperature upon receipt by Spectrum Analytical courier was recorded as 2.6 degrees Celsius. The condition of these samples was further noted as received on ice. The samples were transported on ice to the laboratory facility and the temperature was recorded at 0.6 degrees Celsius upon receipt at the laboratory. Please refer to the Chain of Custody for details specific to sample receipt times.

An infrared thermometer with a tolerance of +/- 2.0 degrees Celsius was used immediately upon receipt of the samples.

If a Matrix Spike (MS), Matrix Spike Duplicate (MSD) or Duplicate (DUP) was not requested on the Chain of Custody, method criteria may have been fulfilled with a source sample not of this Sample Delivery Group.

MADEP has published a list of analytical methods (CAM) which provides a series of recommended protocols for the acquisition, analysis and reporting of analytical data in support of MCP decisions. "Presumptive Certainty" can be established only for those methods published by the MADEP in the MCP CAM. The compounds and/or elements reported were specifically requested by the client on the Chain of Custody and in some cases may not include the full analyte list as defined in the method. Regulatory limits may not be achieved if specific method and/or technique was not requested on the Chain of Custody.

According to WSC-CAM 5/2009 Rev.1, Table 11 A-1, recovery for some VOC analytes have been deemed potentially difficult. Although they may still be within the recommended recovery range, a range has been set based on historical control limits.

Some target analytes which are not listed as exceptions in the Summary of CAM Reporting Limits may exceed the recommended RL based on sample initial volume or weight provided, % moisture content, or responsiveness of a particular analyte to purge and trap instrumentation.

See below for any non-conformances and issues relating to quality control samples and/or sample analysis/matrix.

+MADEP EPH 5/2004 R

Laboratory Control Samples:

1108091 BSD

Benzo (b) fluoranthene RPD 28% (25%) is outside individual acceptance criteria, but within overall method allowances.

Benzo (k) fluoranthene RPD 33% (25%) is outside individual acceptance criteria, but within overall method allowances.

1108091-BSD1

The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.

Benzo (b) fluoranthene
Benzo (k) fluoranthene

Samples:

SB27755-02 CSB-02-042611

Duplicate analysis confirmed surrogate failure due to matrix effects.

1-Chlorooctadecane
Ortho-Terphenyl

Sample dilution required for high concentration of target analytes to be within the instrument calibration range.

SB27755-02RE1 CSB-02-042611

Duplicate analysis confirmed surrogate failure due to matrix effects.

1-Chlorooctadecane
Ortho-Terphenyl

+MADEP EPH 5/2004 R

Samples:

SB27755-02RE1 CSB-02-042611

Sample dilution required for high concentration of target analytes to be within the instrument calibration range.

SW846 6010C

Samples:

SB27755-02 CSB-02-042611

The Reporting Limit has been raised to account for matrix interference.

Antimony

SW846 7471B

Samples:

SB27755-01 CSB-01-042611

Sample dilution required for high concentration of target analytes to be within the instrument calibration range.

Mercury

SB27755-02 CSB-02-042611

Sample dilution required for high concentration of target analytes to be within the instrument calibration range.

Mercury

Sample Identification

CSB-01-042611

SB27755-01

Client Project #

11-1401

Matrix

Soil

Collection Date/Time

26-Apr-11 13:25

Received

27-Apr-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3545A

C9-C18 Aliphatic Hydrocarbons	BRL			mg/kg dry	11.7	1	+MADEP EPH 5/2004 R	02-May-11	03-May-11	MM	1107877	
C19-C36 Aliphatic Hydrocarbons	BRL			mg/kg dry	11.7	1	"	"	"	"	"	
C11-C22 Aromatic Hydrocarbons	32.7			mg/kg dry	11.7	1	"	"	"	"	"	
Unadjusted C11-C22 Aromatic Hydrocarbons	42.3			mg/kg dry	11.7	1	"	"	"	"	"	
Total Petroleum Hydrocarbons	32.7			mg/kg dry	11.7	1	"	"	"	"	"	
Unadjusted Total Petroleum Hydrocarbons	42.3			mg/kg dry	11.7	1	"	"	"	"	"	

EPH Target PAH AnalytesPrepared by method SW846 3545A

91-20-3	Naphthalene	BRL		µg/kg dry	391	1	"	"	"	"	"	
91-57-6	2-Methylnaphthalene	BRL		µg/kg dry	391	1	"	"	"	"	"	
208-96-8	Acenaphthylene	BRL		µg/kg dry	391	1	"	"	"	"	"	
83-32-9	Acenaphthene	BRL		µg/kg dry	391	1	"	"	"	"	"	
86-73-7	Fluorene	BRL		µg/kg dry	391	1	"	"	"	"	"	
85-01-8	Phenanthrene	1,720		µg/kg dry	391	1	"	"	"	"	"	
120-12-7	Anthracene	429		µg/kg dry	391	1	"	"	"	"	"	
206-44-0	Fluoranthene	1,690		µg/kg dry	391	1	"	"	"	"	"	
129-00-0	Pyrene	1,640		µg/kg dry	391	1	"	"	"	"	"	
56-55-3	Benzo (a) anthracene	770		µg/kg dry	391	1	"	"	"	"	"	
218-01-9	Chrysene	960		µg/kg dry	391	1	"	"	"	"	"	
205-99-2	Benzo (b) fluoranthene	399		µg/kg dry	391	1	"	"	"	"	"	
207-08-9	Benzo (k) fluoranthene	628		µg/kg dry	391	1	"	"	"	"	"	
50-32-8	Benzo (a) pyrene	727		µg/kg dry	391	1	"	"	"	"	"	
193-39-5	Indeno (1,2,3-cd) pyrene	BRL		µg/kg dry	391	1	"	"	"	"	"	
53-70-3	Dibenzo (a,h) anthracene	BRL		µg/kg dry	391	1	"	"	"	"	"	
191-24-2	Benzo (g,h,i) perylene	BRL		µg/kg dry	391	1	"	"	"	"	"	

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	72			40-140 %		"	"	"	"	"	
84-15-1	Ortho-Terphenyl	67			40-140 %		"	"	"	"	"	
321-60-8	2-Fluorobiphenyl	88			40-140 %		"	"	"	"	"	

Total Metals by EPA 6000/7000 Series Methods

7440-22-4	Silver	BRL		mg/kg dry	1.74	1	SW846 6010C	02-May-11	03-May-11	ARF	1107916	
7440-38-2	Arsenic	20.1		mg/kg dry	1.74	1	"	"	"	"	"	
7440-41-7	Beryllium	BRL		mg/kg dry	0.581	1	"	"	"	"	"	
7440-43-9	Cadmium	0.697		mg/kg dry	0.581	1	"	"	"	"	"	
7440-47-3	Chromium	15.5		mg/kg dry	1.16	1	"	"	"	"	"	
7440-50-8	Copper	217		mg/kg dry	1.16	1	"	"	04-May-11	"	"	
7439-97-6	Mercury	5.11	GS1	mg/kg dry	0.315	10	SW846 7471B	"	04-May-11	EDT	1107918	
7440-02-0	Nickel	17.2		mg/kg dry	1.16	1	SW846 6010C	"	03-May-11	ARF	1107916	
7439-92-1	Lead	1,110		mg/kg dry	1.74	1	"	"	"	"	"	
7440-36-0	Antimony	BRL		mg/kg dry	5.81	1	"	"	"	"	"	
7782-49-2	Selenium	BRL		mg/kg dry	2.32	1	"	"	"	"	"	
7440-28-0	Thallium	BRL		mg/kg dry	3.48	1	"	"	"	"	"	
7440-66-6	Zinc	331		mg/kg dry	1.16	1	"	"	"	"	"	

This laboratory report is not valid without an authorized signature on the cover page.

* Reportable Detection Limit

BRL = Below Reporting Limit

Page 4 of 18

Sample Identification

CSB-01-042611

SB27755-01

Client Project #

11-1401

Matrix

Soil

Collection Date/Time

26-Apr-11 13:25

Received

27-Apr-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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General Chemistry Parameters

% Solids

84.2

%

1

SM2540 G Mod.

02-May-11

02-May-11

BD

1107900

Sample Identification

CSB-02-042611

SB27755-02

Client Project #

11-1401

Matrix

Soil

Collection Date/Time

26-Apr-11 13:40

Received

27-Apr-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic Ranges

GS1

Prepared by method SW846 3545A

C9-C18 Aliphatic Hydrocarbons	BRL			mg/kg dry	11.7	1	+MADEP EPH 5/2004 R	02-May-11	03-May-11	MM	1107877	
C19-C36 Aliphatic Hydrocarbons	BRL			mg/kg dry	11.7	1	"	"	"	"	"	"
C11-C22 Aromatic Hydrocarbons	384			mg/kg dry	117	10	"	"	"	"	"	"
Unadjusted C11-C22 Aromatic Hydrocarbons	702			mg/kg dry	117	10	"	"	"	"	"	"
Total Petroleum Hydrocarbons	384			mg/kg dry	11.7	1	"	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	702			mg/kg dry	11.7	1	"	"	"	"	"	"

Re-analysis of EPH Aliphatic/Aromatic Ranges

GS1

Prepared by method SW846 3545A

C9-C18 Aliphatic Hydrocarbons	BRL			mg/kg dry	34.6	1	+MADEP EPH 5/2004 R	04-May-11	05-May-11	MM	1108091	
C19-C36 Aliphatic Hydrocarbons	BRL			mg/kg dry	34.6	1	"	"	"	"	"	"
C11-C22 Aromatic Hydrocarbons	798			mg/kg dry	346	10	"	"	"	"	"	"
Unadjusted C11-C22 Aromatic Hydrocarbons	1,150			mg/kg dry	346	10	"	"	"	"	"	"
Total Petroleum Hydrocarbons	798			mg/kg dry	346	1	"	"	"	"	"	"
Unadjusted Total Petroleum Hydrocarbons	1,150			mg/kg dry	346	1	"	"	"	"	"	"

EPH Target PAH Analytes

GS1

Prepared by method SW846 3545A

91-20-3	Naphthalene	6,560		µg/kg dry	3900	10	+MADEP EPH 5/2004 R	02-May-11	03-May-11	MM	1107877	
91-57-6	2-Methylnaphthalene	4,560		µg/kg dry	3900	10	"	"	"	"	"	"
208-96-8	Acenaphthylene	BRL		µg/kg dry	3900	10	"	"	"	"	"	"
83-32-9	Acenaphthene	13,700		µg/kg dry	3900	10	"	"	"	"	"	"
86-73-7	Fluorene	12,600		µg/kg dry	3900	10	"	"	"	"	"	"
85-01-8	Phenanthrene	83,000		µg/kg dry	3900	10	"	"	"	"	"	"
120-12-7	Anthracene	19,800		µg/kg dry	3900	10	"	"	"	"	"	"
206-44-0	Fluoranthene	54,300		µg/kg dry	3900	10	"	"	"	"	"	"
129-00-0	Pyrene	46,300		µg/kg dry	3900	10	"	"	"	"	"	"
56-55-3	Benzo (a) anthracene	18,600		µg/kg dry	3900	10	"	"	"	"	"	"
218-01-9	Chrysene	18,500		µg/kg dry	3900	10	"	"	"	"	"	"
205-99-2	Benzo (b) fluoranthene	7,450		µg/kg dry	3900	10	"	"	"	"	"	"
207-08-9	Benzo (k) fluoranthene	12,700		µg/kg dry	3900	10	"	"	"	"	"	"
50-32-8	Benzo (a) pyrene	12,800		µg/kg dry	3900	10	"	"	"	"	"	"
193-39-5	Indeno (1,2,3-cd) pyrene	BRL		µg/kg dry	3900	10	"	"	"	"	"	"
53-70-3	Dibenzo (a,h) anthracene	BRL		µg/kg dry	3900	10	"	"	"	"	"	"
191-24-2	Benzo (g,h,i) perylene	BRL		µg/kg dry	3900	10	"	"	"	"	"	"

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	17	SDUP		40-140 %		"	"	"	"	"	"
84-15-1	Ortho-Terphenyl	13	SDUP		40-140 %		"	"	"	"	"	"
321-60-8	2-Fluorobiphenyl	73			40-140 %		"	"	"	"	"	"

Re-analysis of EPH Target PAH Analytes

GS1

Prepared by method SW846 3545A

91-20-3	Naphthalene	BRL		µg/kg dry	11500	10	+MADEP EPH 5/2004 R	04-May-11	05-May-11	MM	1108091	
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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

CSB-02-042611

SB27755-02

Client Project #

11-1401

Matrix

Soil

Collection Date/Time

26-Apr-11 13:40

Received

27-Apr-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsRe-analysis of EPH Target PAH Analytes

GS1

Prepared by method SW846 3545A

91-57-6	2-Methylnaphthalene	BRL		µg/kg dry	11500	10	+MADEP EPH 5/2004 R	04-May-11	05-May-11	MM	1108091	
208-96-8	Acenaphthylene	BRL		µg/kg dry	11500	10	"	"	"	"	"	
83-32-9	Acenaphthene	BRL		µg/kg dry	11500	10	"	"	"	"	"	
86-73-7	Fluorene	BRL		µg/kg dry	11500	10	"	"	"	"	"	
85-01-8	Phenanthrene	85,600		µg/kg dry	11500	10	"	"	"	"	"	
120-12-7	Anthracene	20,400		µg/kg dry	11500	10	"	"	"	"	"	
206-44-0	Fluoranthene	63,500		µg/kg dry	11500	10	"	"	"	"	"	
129-00-0	Pyrene	53,900		µg/kg dry	11500	10	"	"	"	"	"	
56-55-3	Benzo (a) anthracene	23,400		µg/kg dry	11500	10	"	"	"	"	"	
218-01-9	Chrysene	22,600		µg/kg dry	11500	10	"	"	"	"	"	
205-99-2	Benzo (b) fluoranthene	12,500		µg/kg dry	11500	10	"	"	"	"	"	
207-08-9	Benzo (k) fluoranthene	14,000		µg/kg dry	11500	10	"	"	"	"	"	
50-32-8	Benzo (a) pyrene	17,000		µg/kg dry	11500	10	"	"	"	"	"	
193-39-5	Indeno (1,2,3-cd) pyrene	BRL		µg/kg dry	11500	10	"	"	"	"	"	
53-70-3	Dibenzo (a,h) anthracene	BRL		µg/kg dry	11500	10	"	"	"	"	"	
191-24-2	Benzo (g,h,i) perylene	BRL		µg/kg dry	11500	10	"	"	"	"	"	

Surrogate recoveries:

3386-33-2	1-Chlorooctadecane	21	SDUP		40-140 %		"	"	"	"	"	
84-15-1	Ortho-Terphenyl	18	SDUP		40-140 %		"	"	"	"	"	
321-60-8	2-Fluorobiphenyl	73			40-140 %		"	"	"	"	"	

Total Metals by EPA 6000/7000 Series Methods

7440-22-4	Silver	BRL		mg/kg dry	1.55	1	SW846 6010C	02-May-11	03-May-11	ARF	1107916	
7440-38-2	Arsenic	29.5		mg/kg dry	1.55	1	"	"	"	"	"	
7440-41-7	Beryllium	BRL		mg/kg dry	0.516	1	"	"	"	"	"	
7440-43-9	Cadmium	1.65		mg/kg dry	0.516	1	"	"	"	"	"	
7440-47-3	Chromium	16.1		mg/kg dry	1.03	1	"	"	"	"	"	
7440-50-8	Copper	486		mg/kg dry	1.03	1	"	"	04-May-11	"	"	
7439-97-6	Mercury	6.96	GS1	mg/kg dry	1.77	50	SW846 7471B	"	04-May-11	EDT	1107918	
7440-02-0	Nickel	21.8		mg/kg dry	1.03	1	SW846 6010C	"	03-May-11	ARF	1107916	
7439-92-1	Lead	466		mg/kg dry	1.55	1	"	"	"	"	"	
7440-36-0	Antimony	BRL	R01	mg/kg dry	51.6	10	"	"	04-May-11	"	"	
7782-49-2	Selenium	BRL		mg/kg dry	2.06	1	"	"	03-May-11	"	"	
7440-28-0	Thallium	BRL		mg/kg dry	3.10	1	"	"	"	"	"	
7440-66-6	Zinc	202		mg/kg dry	1.03	1	"	"	"	"	"	

General Chemistry Parameters

% Solids	84.3			%		1	SM2540 G Mod.	02-May-11	02-May-11	BD	1107900	
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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107877 - SW846 3545A										
<u>Blank (1107877-BLK1)</u>	<u>Prepared & Analyzed: 02-May-11</u>									
C9-C18 Aliphatic Hydrocarbons	BRL		mg/kg wet	5.00						
C19-C36 Aliphatic Hydrocarbons	BRL		mg/kg wet	5.00						
C11-C22 Aromatic Hydrocarbons	BRL		mg/kg wet	5.00						
Unadjusted C11-C22 Aromatic Hydrocarbons	BRL		mg/kg wet	5.00						
Total Petroleum Hydrocarbons	BRL		mg/kg wet	5.00						
Unadjusted Total Petroleum Hydrocarbons	BRL		mg/kg wet	5.00						
Naphthalene	BRL		µg/kg wet	166						
2-Methylnaphthalene	BRL		µg/kg wet	166						
Acenaphthylene	BRL		µg/kg wet	166						
Acenaphthene	BRL		µg/kg wet	166						
Fluorene	BRL		µg/kg wet	166						
Phenanthrene	BRL		µg/kg wet	166						
Anthracene	BRL		µg/kg wet	166						
Fluoranthene	BRL		µg/kg wet	166						
Pyrene	BRL		µg/kg wet	166						
Benzo (a) anthracene	BRL		µg/kg wet	166						
Chrysene	BRL		µg/kg wet	166						
Benzo (b) fluoranthene	BRL		µg/kg wet	166						
Benzo (k) fluoranthene	BRL		µg/kg wet	166						
Benzo (a) pyrene	BRL		µg/kg wet	166						
Indeno (1,2,3-cd) pyrene	BRL		µg/kg wet	166						
Dibenzo (a,h) anthracene	BRL		µg/kg wet	166						
Benzo (g,h,i) perylene	BRL		µg/kg wet	166						
Naphthalene (aliphatic fraction)	0.00		µg/kg wet							
2-Methylnaphthalene (aliphatic fraction)	0.00		µg/kg wet							
<i>Surrogate: 1-Chlorooctadecane</i>	2720		µg/kg wet		3330		81	40-140		
<i>Surrogate: Ortho-Terphenyl</i>	2250		µg/kg wet		3330		67	40-140		
<i>Surrogate: 2-Fluorobiphenyl</i>	2180		µg/kg wet		2670		82	40-140		
<u>LCS (1107877-BS1)</u>	<u>Prepared & Analyzed: 02-May-11</u>									
C9-C18 Aliphatic Hydrocarbons	19.1		mg/kg wet	5.00	40.0		48	40-140		
C19-C36 Aliphatic Hydrocarbons	38.5		mg/kg wet	5.00	53.3		72	40-140		
C11-C22 Aromatic Hydrocarbons	65.3		mg/kg wet	5.00	113		58	40-140		
Naphthalene	3500		µg/kg wet	166	6670		52	40-140		
2-Methylnaphthalene	4020		µg/kg wet	166	6670		60	40-140		
Acenaphthylene	4230		µg/kg wet	166	6670		63	40-140		
Acenaphthene	4360		µg/kg wet	166	6670		65	40-140		
Fluorene	4600		µg/kg wet	166	6670		69	40-140		
Phenanthrene	4590		µg/kg wet	166	6670		69	40-140		
Anthracene	4370		µg/kg wet	166	6670		66	40-140		
Fluoranthene	4880		µg/kg wet	166	6670		73	40-140		
Pyrene	4870		µg/kg wet	166	6670		73	40-140		
Benzo (a) anthracene	4630		µg/kg wet	166	6670		69	40-140		
Chrysene	5050		µg/kg wet	166	6670		76	40-140		
Benzo (b) fluoranthene	4290		µg/kg wet	166	6670		64	40-140		
Benzo (k) fluoranthene	5150		µg/kg wet	166	6670		77	40-140		
Benzo (a) pyrene	4540		µg/kg wet	166	6670		68	40-140		
Indeno (1,2,3-cd) pyrene	4220		µg/kg wet	166	6670		63	40-140		
Dibenzo (a,h) anthracene	4090		µg/kg wet	166	6670		61	40-140		
Benzo (g,h,i) perylene	4270		µg/kg wet	166	6670		64	40-140		
Naphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200		
2-Methylnaphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200		

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* Reportable Detection Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107877 - SW846 3545A										
<u>LCS (1107877-BS1)</u>					<u>Prepared & Analyzed: 02-May-11</u>					
Surrogate: 1-Chlorooctadecane	2000		µg/kg wet		3330		60	40-140		
Surrogate: Ortho-Terphenyl	2360		µg/kg wet		3330		71	40-140		
Surrogate: 2-Fluorobiphenyl	2560		µg/kg wet		2670		96	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS (1107877-BS2)</u>					<u>Prepared: 02-May-11 Analyzed: 03-May-11</u>					
C9-C18 Aliphatic Hydrocarbons	26.5		mg/kg wet	5.00	40.0		66	40-140		
C19-C36 Aliphatic Hydrocarbons	34.7		mg/kg wet	5.00	53.3		65	40-140		
C11-C22 Aromatic Hydrocarbons	70.0		mg/kg wet	5.00	113		62	40-140		
Naphthalene	3550		µg/kg wet	166	6670		53	40-140		
2-Methylnaphthalene	4000		µg/kg wet	166	6670		60	40-140		
Acenaphthylene	4420		µg/kg wet	166	6670		66	40-140		
Acenaphthene	4430		µg/kg wet	166	6670		66	40-140		
Fluorene	4870		µg/kg wet	166	6670		73	40-140		
Phenanthrene	5010		µg/kg wet	166	6670		75	40-140		
Anthracene	4920		µg/kg wet	166	6670		74	40-140		
Fluoranthene	5280		µg/kg wet	166	6670		79	40-140		
Pyrene	5280		µg/kg wet	166	6670		79	40-140		
Benzo (a) anthracene	5090		µg/kg wet	166	6670		76	40-140		
Chrysene	5260		µg/kg wet	166	6670		79	40-140		
Benzo (b) fluoranthene	4770		µg/kg wet	166	6670		72	40-140		
Benzo (k) fluoranthene	5300		µg/kg wet	166	6670		80	40-140		
Benzo (a) pyrene	5160		µg/kg wet	166	6670		77	40-140		
Indeno (1,2,3-cd) pyrene	5140		µg/kg wet	166	6670		77	40-140		
Dibenzo (a,h) anthracene	5020		µg/kg wet	166	6670		75	40-140		
Benzo (g,h,i) perylene	5250		µg/kg wet	166	6670		79	40-140		
Naphthalene (aliphatic fraction)	0.00		µg/kg wet		6670			0-200		
2-Methylnaphthalene (aliphatic fraction)	0.00		µg/kg wet		6670			0-200		
Surrogate: 1-Chlorooctadecane	1790		µg/kg wet		3330		54	40-140		
Surrogate: Ortho-Terphenyl	2540		µg/kg wet		3330		76	40-140		
Surrogate: 2-Fluorobiphenyl	2110		µg/kg wet		2670		79	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS Dup (1107877-BSD1)</u>					<u>Prepared & Analyzed: 02-May-11</u>					
C9-C18 Aliphatic Hydrocarbons	18.2		mg/kg wet	5.00	40.0		46	40-140	5	25
C19-C36 Aliphatic Hydrocarbons	31.8		mg/kg wet	5.00	53.3		60	40-140	19	25
C11-C22 Aromatic Hydrocarbons	58.0		mg/kg wet	5.00	113		51	40-140	12	25
Naphthalene	2800		µg/kg wet	166	6670		42	40-140	22	25
2-Methylnaphthalene	3200		µg/kg wet	166	6670		48	40-140	23	25
Acenaphthylene	3480		µg/kg wet	166	6670		52	40-140	19	25
Acenaphthene	3620		µg/kg wet	166	6670		54	40-140	19	25
Fluorene	4000		µg/kg wet	166	6670		60	40-140	14	25
Phenanthrene	4130		µg/kg wet	166	6670		62	40-140	11	25
Anthracene	3890		µg/kg wet	166	6670		58	40-140	12	25
Fluoranthene	4450		µg/kg wet	166	6670		67	40-140	9	25
Pyrene	4530		µg/kg wet	166	6670		68	40-140	7	25
Benzo (a) anthracene	4320		µg/kg wet	166	6670		65	40-140	7	25
Chrysene	4680		µg/kg wet	166	6670		70	40-140	8	25
Benzo (b) fluoranthene	3810		µg/kg wet	166	6670		57	40-140	12	25
Benzo (k) fluoranthene	5130		µg/kg wet	166	6670		77	40-140	0.5	25

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* Reportable Detection Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107877 - SW846 3545A										
<u>LCS Dup (1107877-BSD1)</u>					<u>Prepared & Analyzed: 02-May-11</u>					
Benzo (a) pyrene	4300		µg/kg wet	166	6670		64	40-140	5	25
Indeno (1,2,3-cd) pyrene	4180		µg/kg wet	166	6670		63	40-140	0.9	25
Dibenzo (a,h) anthracene	3990		µg/kg wet	166	6670		60	40-140	3	25
Benzo (g,h,i) perylene	4250		µg/kg wet	166	6670		64	40-140	0.4	25
Naphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200	0	200
2-Methylnaphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200	0	200
Surrogate: 1-Chlorooctadecane	1470		µg/kg wet		3330		44	40-140		
Surrogate: Ortho-Terphenyl	2190		µg/kg wet		3330		66	40-140		
Surrogate: 2-Fluorobiphenyl	1920		µg/kg wet		2670		72	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
Batch 1108091 - SW846 3545A										
<u>Blank (1108091-BLK1)</u>					<u>Prepared & Analyzed: 04-May-11</u>					
C9-C18 Aliphatic Hydrocarbons	BRL		mg/kg wet	5.00						
C19-C36 Aliphatic Hydrocarbons	BRL		mg/kg wet	5.00						
C11-C22 Aromatic Hydrocarbons	BRL		mg/kg wet	5.00						
Unadjusted C11-C22 Aromatic Hydrocarbons	BRL		mg/kg wet	5.00						
Total Petroleum Hydrocarbons	BRL		mg/kg wet	5.00						
Unadjusted Total Petroleum Hydrocarbons	BRL		mg/kg wet	5.00						
Naphthalene	BRL		µg/kg wet	166						
2-Methylnaphthalene	BRL		µg/kg wet	166						
Acenaphthylene	BRL		µg/kg wet	166						
Acenaphthene	BRL		µg/kg wet	166						
Fluorene	BRL		µg/kg wet	166						
Phenanthrene	BRL		µg/kg wet	166						
Anthracene	BRL		µg/kg wet	166						
Fluoranthene	BRL		µg/kg wet	166						
Pyrene	BRL		µg/kg wet	166						
Benzo (a) anthracene	BRL		µg/kg wet	166						
Chrysene	BRL		µg/kg wet	166						
Benzo (b) fluoranthene	BRL		µg/kg wet	166						
Benzo (k) fluoranthene	BRL		µg/kg wet	166						
Benzo (a) pyrene	BRL		µg/kg wet	166						
Indeno (1,2,3-cd) pyrene	BRL		µg/kg wet	166						
Dibenzo (a,h) anthracene	BRL		µg/kg wet	166						
Benzo (g,h,i) perylene	BRL		µg/kg wet	166						
Naphthalene (aliphatic fraction)	0.00		µg/kg wet							
2-Methylnaphthalene (aliphatic fraction)	0.00		µg/kg wet							
Surrogate: 1-Chlorooctadecane	2080		µg/kg wet		3330		62	40-140		
Surrogate: Ortho-Terphenyl	2470		µg/kg wet		3330		74	40-140		
Surrogate: 2-Fluorobiphenyl	2220		µg/kg wet		2670		83	40-140		
<u>LCS (1108091-BS1)</u>					<u>Prepared & Analyzed: 04-May-11</u>					
C9-C18 Aliphatic Hydrocarbons	17.3		mg/kg wet	5.00	40.0		43	40-140		
C19-C36 Aliphatic Hydrocarbons	32.4		mg/kg wet	5.00	53.3		61	40-140		
C11-C22 Aromatic Hydrocarbons	63.3		mg/kg wet	5.00	113		56	40-140		
Naphthalene	3080		µg/kg wet	166	6670		46	40-140		
2-Methylnaphthalene	3470		µg/kg wet	166	6670		52	40-140		
Acenaphthylene	3830		µg/kg wet	166	6670		57	40-140		
Acenaphthene	3890		µg/kg wet	166	6670		58	40-140		
Fluorene	4320		µg/kg wet	166	6670		65	40-140		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1108091 - SW846 3545A										
<u>LCS (1108091-BS1)</u>					<u>Prepared & Analyzed: 04-May-11</u>					
Phenanthrene	4680		µg/kg wet	166	6670		70	40-140		
Anthracene	4520		µg/kg wet	166	6670		68	40-140		
Fluoranthene	5020		µg/kg wet	166	6670		75	40-140		
Pyrene	4970		µg/kg wet	166	6670		75	40-140		
Benzo (a) anthracene	4790		µg/kg wet	166	6670		72	40-140		
Chrysene	5260		µg/kg wet	166	6670		79	40-140		
Benzo (b) fluoranthene	4160		µg/kg wet	166	6670		62	40-140		
Benzo (k) fluoranthene	4300		µg/kg wet	166	6670		64	40-140		
Benzo (a) pyrene	4610		µg/kg wet	166	6670		69	40-140		
Indeno (1,2,3-cd) pyrene	4130		µg/kg wet	166	6670		62	40-140		
Dibenzo (a,h) anthracene	3990		µg/kg wet	166	6670		60	40-140		
Benzo (g,h,i) perylene	4050		µg/kg wet	166	6670		61	40-140		
Naphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200		
2-Methylnaphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200		
<i>Surrogate: 1-Chlorooctadecane</i>	1420		µg/kg wet		3330		43	40-140		
<i>Surrogate: Ortho-Terphenyl</i>	2180		µg/kg wet		3330		65	40-140		
<i>Surrogate: 2-Fluorobiphenyl</i>	2160		µg/kg wet		2670		81	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS (1108091-BS2)</u>					<u>Prepared & Analyzed: 04-May-11</u>					
C9-C18 Aliphatic Hydrocarbons	19.2		mg/kg wet	5.00	40.0		48	40-140		
C19-C36 Aliphatic Hydrocarbons	32.9		mg/kg wet	5.00	53.3		62	40-140		
C11-C22 Aromatic Hydrocarbons	67.3		mg/kg wet	5.00	113		59	40-140		
Naphthalene	3580		µg/kg wet	166	6670		54	40-140		
2-Methylnaphthalene	3930		µg/kg wet	166	6670		59	40-140		
Acenaphthylene	4250		µg/kg wet	166	6670		64	40-140		
Acenaphthene	4290		µg/kg wet	166	6670		64	40-140		
Fluorene	4650		µg/kg wet	166	6670		70	40-140		
Phenanthrene	4660		µg/kg wet	166	6670		70	40-140		
Anthracene	4570		µg/kg wet	166	6670		69	40-140		
Fluoranthene	4920		µg/kg wet	166	6670		74	40-140		
Pyrene	4900		µg/kg wet	166	6670		73	40-140		
Benzo (a) anthracene	4760		µg/kg wet	166	6670		71	40-140		
Chrysene	5120		µg/kg wet	166	6670		77	40-140		
Benzo (b) fluoranthene	4840		µg/kg wet	166	6670		73	40-140		
Benzo (k) fluoranthene	4950		µg/kg wet	166	6670		74	40-140		
Benzo (a) pyrene	4800		µg/kg wet	166	6670		72	40-140		
Indeno (1,2,3-cd) pyrene	4290		µg/kg wet	166	6670		64	40-140		
Dibenzo (a,h) anthracene	4210		µg/kg wet	166	6670		63	40-140		
Benzo (g,h,i) perylene	4270		µg/kg wet	166	6670		64	40-140		
Naphthalene (aliphatic fraction)	0.00		µg/kg wet		6670			0-200		
2-Methylnaphthalene (aliphatic fraction)	0.00		µg/kg wet		6670			0-200		
<i>Surrogate: 1-Chlorooctadecane</i>	1710		µg/kg wet		3330		51	40-140		
<i>Surrogate: Ortho-Terphenyl</i>	2360		µg/kg wet		3330		71	40-140		
<i>Surrogate: 2-Fluorobiphenyl</i>	2280		µg/kg wet		2670		85	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS Dup (1108091-BSD1)</u>					<u>Prepared & Analyzed: 04-May-11</u>					
C9-C18 Aliphatic Hydrocarbons	21.7		mg/kg wet	5.00	40.0		54	40-140	23	25
C19-C36 Aliphatic Hydrocarbons	38.0		mg/kg wet	5.00	53.3		71	40-140	16	25

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1108091 - SW846 3545A										
<u>LCS Dup (1108091-BS01)</u>					<u>Prepared & Analyzed: 04-May-11</u>					
C11-C22 Aromatic Hydrocarbons	74.7		mg/kg wet	5.00	113		66	40-140	16	25
Naphthalene	3630		µg/kg wet	166	6670		54	40-140	16	25
2-Methylnaphthalene	4120		µg/kg wet	166	6670		62	40-140	17	25
Acenaphthylene	4670		µg/kg wet	166	6670		70	40-140	20	25
Acenaphthene	4740		µg/kg wet	166	6670		71	40-140	20	25
Fluorene	5230		µg/kg wet	166	6670		78	40-140	19	25
Phenanthrene	5450		µg/kg wet	166	6670		82	40-140	15	25
Anthracene	5330		µg/kg wet	166	6670		80	40-140	16	25
Fluoranthene	5770		µg/kg wet	166	6670		87	40-140	14	25
Pyrene	5740		µg/kg wet	166	6670		86	40-140	14	25
Benzo (a) anthracene	5690		µg/kg wet	166	6670		85	40-140	17	25
Chrysene	6050		µg/kg wet	166	6670		91	40-140	14	25
Benzo (b) fluoranthene	5530	QR2	µg/kg wet	166	6670		83	40-140	28	25
Benzo (k) fluoranthene	6010	QR2	µg/kg wet	166	6670		90	40-140	33	25
Benzo (a) pyrene	5650		µg/kg wet	166	6670		85	40-140	20	25
Indeno (1,2,3-cd) pyrene	4980		µg/kg wet	166	6670		75	40-140	19	25
Dibenzo (a,h) anthracene	4910		µg/kg wet	166	6670		74	40-140	21	25
Benzo (g,h,i) perylene	4880		µg/kg wet	166	6670		73	40-140	19	25
Naphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200	0	200
2-Methylnaphthalene (aliphatic fraction)	0.00667		µg/kg wet		6670		0.0001	0-200	0	200
<i>Surrogate: 1-Chlorooctadecane</i>	2210		µg/kg wet		3330		66	40-140		
<i>Surrogate: Ortho-Terphenyl</i>	2510		µg/kg wet		3330		75	40-140		
<i>Surrogate: 2-Fluorobiphenyl</i>	2260		µg/kg wet		2670		85	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		

Total Metals by EPA 6000/7000 Series Methods - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1107916 - SW846 3050B										
<u>Blank (1107916-BLK1)</u>					<u>Prepared: 02-May-11 Analyzed: 03-May-11</u>					
Antimony	BRL		mg/kg wet	5.00						
Zinc	BRL		mg/kg wet	1.00						
Thallium	BRL		mg/kg wet	3.00						
Selenium	BRL		mg/kg wet	2.00						
Nickel	BRL		mg/kg wet	1.00						
Lead	BRL		mg/kg wet	1.50						
Silver	BRL		mg/kg wet	1.50						
Copper	BRL		mg/kg wet	1.00						
Cadmium	BRL		mg/kg wet	0.500						
Arsenic	BRL		mg/kg wet	1.50						
Beryllium	BRL		mg/kg wet	0.500						
Chromium	BRL		mg/kg wet	1.00						
<u>Reference (1107916-SRM1)</u>					<u>Prepared: 02-May-11 Analyzed: 03-May-11</u>					
Lead	40.9		mg/kg wet	1.50	39.1		105	83.6-116.5		
Thallium	139		mg/kg wet	3.00	136		102	81.2-118.8		
Antimony	74.8		mg/kg wet	5.00	54.4		138	9.2-191.5		
Zinc	146		mg/kg wet	1.00	144		102	82.1-117.9		
Nickel	36.5		mg/kg wet	1.00	36.5		100	83.3-116.6		
Selenium	61.8		mg/kg wet	2.00	65.2		95	80.3-119.7		
Chromium	63.9		mg/kg wet	1.00	60.0		106	81.7-117.9		
Cadmium	42.8		mg/kg wet	0.500	41.1		104	84-116		
Beryllium	46.1		mg/kg wet	0.500	45.2		102	83.8-115.7		
Arsenic	56.7		mg/kg wet	1.50	55.9		101	82.9-117.4		
Silver	22.0		mg/kg wet	1.50	21.0		105	66.1-133.7		
Copper	66.5		mg/kg wet	1.00	60.0		111	83.8-116.2		
<u>Reference (1107916-SRM2)</u>					<u>Prepared: 02-May-11 Analyzed: 03-May-11</u>					
Antimony	72.2		mg/kg wet	5.00	54.6		132	9.2-191.5		
Zinc	142		mg/kg wet	1.00	144		98	82.1-117.9		
Thallium	136		mg/kg wet	3.00	137		100	81.2-118.8		
Selenium	63.0		mg/kg wet	2.00	65.4		96	80.3-119.7		
Nickel	36.3		mg/kg wet	1.00	36.7		99	83.3-116.6		
Lead	41.5		mg/kg wet	1.50	39.2		106	83.6-116.5		
Copper	65.8		mg/kg wet	1.00	60.2		109	83.8-116.2		
Chromium	62.9		mg/kg wet	1.00	60.2		104	81.7-117.9		
Cadmium	42.7		mg/kg wet	0.500	41.3		103	84-116		
Beryllium	46.5		mg/kg wet	0.500	45.4		102	83.8-115.7		
Silver	21.9		mg/kg wet	1.50	21.1		104	66.1-133.7		
Arsenic	57.2		mg/kg wet	1.50	56.1		102	82.9-117.4		
Batch 1107918 - EPA200/SW7000 Series										
<u>Blank (1107918-BLK1)</u>					<u>Prepared: 02-May-11 Analyzed: 04-May-11</u>					
Mercury	BRL		mg/kg wet	0.0300						
<u>Reference (1107918-SRM1)</u>					<u>Prepared: 02-May-11 Analyzed: 04-May-11</u>					
Mercury	2.34		mg/kg wet	0.300	2.27		103	71.8-127.8		

This laboratory report is not valid without an authorized signature on the cover page.

* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - CCV Evaluation Report

Analyte(s)	Average RF	CCRF	% D	Limit
Batch S103734				
<u>Calibration Check (S103734-CCV1)</u>				
C9-C18 Aliphatic Hydrocarbons	1.315332E+08	1.06804E+08	-15.7	25
C19-C36 Aliphatic Hydrocarbons	1.533876E+08	1.141596E+08	-6.2	25
C11-C22 Aromatic Hydrocarbons	21.70554	20.55932	-5.3	25
Naphthalene	8.207569	8.864637	8.0	25
2-Methylnaphthalene	5.249364	5.816365	10.8	25
Acenaphthylene	7.632873	8.588267	12.5	25
Acenaphthene	4.714004	5.147529	9.2	25
Fluorene	5.102917	5.919284	16.0	25
Phenanthrene	7.036955	8.006661	13.8	25
Anthracene	7.111659	8.206746	15.4	25
Fluoranthene	6.982094	8.06897	15.6	25
Pyrene	7.12881	8.236464	15.5	25
Benzo (a) anthracene	5.92254	6.845169	15.6	25
Chrysene	5.934326	6.844091	15.3	25
Benzo (b) fluoranthene	6.029999	6.811738	13.0	25
Benzo (k) fluoranthene	5.900239	6.803726	15.3	25
Benzo (a) pyrene	5.406469	6.402828	18.4	25
Indeno (1,2,3-cd) pyrene	6.80145	7.405927	8.9	25
Dibenzo (a,h) anthracene	5.675102	5.950911	4.9	25
Benzo (g,h,i) perylene	5.902326	6.413961	8.7	25

Batch S103777**Calibration Check (S103777-CCV1)**

C9-C18 Aliphatic Hydrocarbons	1.315332E+08	1.090809E+08	-13.8	25
C19-C36 Aliphatic Hydrocarbons	1.533876E+08	1.067433E+08	-15.0	25
C11-C22 Aromatic Hydrocarbons	21.70554	19.61384	-9.6	25
Naphthalene	8.207569	8.633053	5.2	25
2-Methylnaphthalene	5.249364	5.817255	10.8	25
Acenaphthylene	7.632873	8.405521	10.1	25
Acenaphthene	4.714004	5.050643	7.1	25
Fluorene	5.102917	5.634386	10.4	25
Phenanthrene	7.036955	7.448156	5.8	25
Anthracene	7.111659	7.651581	7.6	25
Fluoranthene	6.982094	7.754004	11.1	25
Pyrene	7.12881	7.826457	9.8	25
Benzo (a) anthracene	5.92254	6.709665	13.3	25
Chrysene	5.934326	7.041684	18.7	25
Benzo (b) fluoranthene	6.029999	6.32312	4.9	25
Benzo (k) fluoranthene	5.900239	6.54259	10.9	25
Benzo (a) pyrene	5.406469	6.250204	15.6	25
Indeno (1,2,3-cd) pyrene	6.80145	7.880933	15.9	25
Dibenzo (a,h) anthracene	5.675102	6.382957	12.5	25
Benzo (g,h,i) perylene	5.902326	6.831895	15.7	25

Notes and Definitions

GS1	Sample dilution required for high concentration of target analytes to be within the instrument calibration range.
QR2	The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.
R01	The Reporting Limit has been raised to account for matrix interference.
SDUP	Duplicate analysis confirmed surrogate failure due to matrix effects.
BRL	Below Reporting Limit - Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
NR	Not Reported
RPD	Relative Percent Difference

A plus sign (+) in the Method Reference column indicates the method is not accredited by NELAC.

A Matrix Spike and Matrix Spike Duplicate (MS/MSD) for MADEP EPH CAM may not have been analyzed with the samples in this work order. According to the method these spikes are performed only when requested by the client. If requested the spike recoveries are included in the batch QC data.

Laboratory Control Sample (LCS): A known matrix spiked with compound(s) representative of the target analytes, which is used to document laboratory performance.

Matrix Duplicate: An intra-laboratory split sample which is used to document the precision of a method in a given sample matrix.

Matrix Spike: An aliquot of a sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Method Blank: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

Method Detection Limit (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

Reportable Detection Limit (RDL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes the RDL analyte concentration is selected as the lowest non-zero standard in the calibration curve. While the RDL is approximately 5 to 10 times the MDL, the RDL for each sample takes into account the sample volume/weight, extract/digestate volume, cleanup procedures and, if applicable, dry weight correction. Sample RDLs are highly matrix-dependent.

Surrogate: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. These compounds are spiked into all blanks, standards, and samples prior to analysis. Percent recoveries are calculated for each surrogate.

Continuing Calibration Verification: The calibration relationship established during the initial calibration must be verified at periodic intervals. Concentrations, intervals, and criteria are method specific.

Validated by:
Nicole Leja
Rebecca Merz

The following outlines the condition of all EPH samples contained within this report upon laboratory receipt.

Matrices	Soil			
Containers	✓ Satisfactory			
Aqueous Preservative	✓ N/A	pH \leq 2	pH>2	pH adjusted to <2 in lab
Temperature	✓ Received on ice	✓ Received at 4 \pm 2 °C		

Were all QA/QC procedures followed as required by the EPH method? *Yes*

Were any significant modifications made to the EPH method as specified in Section 11.3? *No*

Were all performance/acceptance standards for required QA/QC procedures achieved? *Yes*


I attest that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Authorized by:



Nicole Leja
Laboratory Director

MassDEP Analytical Protocol Certification Form

Laboratory Name: Spectrum Analytical, Inc.			Project #: 11-1401		
Project Location: TSC-Volpe Center - Cambridge, MA			RTN:		
This form provides certifications for the following data set:			SB27755-01 through SB27755-02		
Matrices: Soil					
CAM Protocol					
8260 VOC CAM II A	✓ 7470/7471 Hg CAM III B	MassDEP VPH CAM IV A	8081 Pesticides CAM V B	7196 Hex Cr CAM VI B	MassDEP APH CAM IX A
8270 SVOC CAM II B	7010 Metals CAM III C	✓ MassDEP EPH CAM IV B	8151 Herbicides CAM V C	8330 Explosives CAM VIII A	TO-15 VOC CAM IX B
✓ 6010 Metals CAM III A	6020 Metals CAM III D	8082 PCB CAM V A	9014 Total Cyanide/PAC CAM VI A	6860 Perchlorate CAM VIII B	
Affirmative responses to questions A through F are required for "Presumptive Certainty" status					
A	Were all samples received in a condition consistent with those described on the Chain of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?				✓ Yes No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?				✓ Yes No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?				✓ Yes No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?				✓ Yes No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?				✓ Yes No Yes No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to questions A through E)?				✓ Yes No
Responses to questions G, H and I below are required for "Presumptive Certainty" status					
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?				Yes ✓ No
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.					
H	Were all QC performance standards specified in the CAM protocol(s) achieved?				Yes ✓ No
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?				Yes ✓ No
All negative responses are addressed in a case narrative on the cover page of this report.					
<p><i>I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.</i></p> <div style="text-align: right; margin-top: 20px;">  Nicole Leja Laboratory Director Date: 5/5/2011 </div>					



Page 1 of 1

8B27755 (an

☐ Standard TAT - 7 to 10 business days
☒ Rush TAT - Date Needed: 5-Day

- All TATs subject to laboratory approval.
- Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

FS Engineers, Inc.
2 Clock Tower Place, Suite 630
Maynard, MA 01754
Telephone #: (978) 298-5956
Project Mgr. Farooq Siddique

FS Engineers

Site Name: TSC Volpe Center

Location: Cambridge State: MA

Sampler(s): Peter J. Buscemi

P.O. No.: _____ RON: _____

1=Na₂S₂O₃ 2=HCl 3=H₂SO₄ 4=HNO₃ 5=NaOH 6=Ascorbic Acid 7=CH₃OH
8=NaHSO₄ 9=Deionized Water 10= 11=

* additional charges may apply

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= X2= X3=

Analyses:

MA DEP MCP CAM Report: Yes ☒ No ☐
CT DPH RCP Report: Yes ☐ No ☐

☐ Standard ☐ No QC ☐ DQA*
☐ NY ASP A* ☐ NY ASP B*
☐ NJ Reduced* ☐ NJ Full*
☐ TIER II* ☐ TIER V*
☒ Other S-1/GW-1

State-specific reporting standards:

G=Grab C=Composite

[illegible]

APPENDIX D

BILL OF LADING DOCUMENTATION

1. Generator's US EPA ID No. <div style="border: 1px solid black; padding: 2px;">M P 6 1 7 4 9 4 2 2 2 4</div>		Manifest Document No. <div style="border: 1px solid black; padding: 2px;">6 4 4 1 7</div>		2. Page 1 of 1																																													
3. Generator's Name and Mailing Address JOHN A. VOLPE NAT'L TRANS SYSTEM CTR 55 BROADWAY CAMBRIDGE, MA 02142				A. B. State Gen. ID SAME																																													
4. Generator's Phone ((617) 494-2000) 5. Transporter 1 Company Name CLEAN VENTURE, INC.				C. State Trans. ID <div style="border: 1px solid black; height: 15px;"></div>																																													
6. US EPA ID Number <div style="border: 1px solid black; padding: 2px;">N J 0 0 0 0 0 2 7 1 9 3</div>				D. Transporter's Phone () E. State Trans. ID <div style="border: 1px solid black; height: 15px;"></div>																																													
7. Transporter 2 Company Name <div style="border: 1px solid black; height: 15px;"></div>				F. Transporter's Phone () G. State Facility's ID NOT REQUIRED																																													
8. US EPA ID Number <div style="border: 1px solid black; height: 15px;"></div>				H. Facility's Phone ((508) 872-5000)																																													
9. Designated Facility Name and Site Address GENERAL CHEMICAL CORP. 133 LELAND STREET FRAMINGHAM, MA 01702				10. US EPA ID Number <div style="border: 1px solid black; padding: 2px;">M A D 0 1 9 3 7 1 0 7 9</div>																																													
11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number) a. NON RCRA NON DOT REGULATED MATERIAL (PURGE WATER) <div style="font-size: 1.2em; margin-top: 10px;">77U82-77U84</div>				12. Containers <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>No.</th> <th>Type</th> <th>Total Quantity</th> <th>WASTE NO.</th> </tr> </thead> <tbody> <tr> <td>003</td> <td>DM</td> <td>130</td> <td>MA99</td> </tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		No.	Type	Total Quantity	WASTE NO.	003	DM	130	MA99																																				
No.	Type	Total Quantity	WASTE NO.																																														
003	DM	130	MA99																																														
J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.) a. b. c. d.				K. Handling Codes for Wastes Listed Above a. b. c. d.																																													
15. Special Handling Instructions and Additional Information 805780/805781/64417/20165 (508) 872-5000 (1)MA01-1 PURGE WATER W/TRACE PETROLEUM <div style="font-size: 1.5em; margin-top: 10px;">3X55</div>																																																	
16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to Federal Regulations for reporting proper disposal of hazardous waste.																																																	
Printed/Typed Name Evan Starr		Signature 		Date Month Day Year 01/27/11																																													
17. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name Robert Hargis		Signature 		Date Month Day Year 01/27/11																																													
18. Transporter 2 Acknowledgement of Receipt of Materials Printed/Typed Name <div style="border: 1px solid black; height: 15px;"></div>		Signature <div style="border: 1px solid black; height: 15px;"></div>		Date Month Day Year <div style="border: 1px solid black; height: 15px;"></div>																																													
19. Discrepancy Indication Space <div style="border: 1px solid black; height: 20px;"></div>																																																	
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19																																																	
Printed/Typed Name Chris Dagon		Signature 		Date Month Day Year 01/27/11																																													



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC112

BILL OF LADING (pursuant to 310 CMR 40.0030)

Release Tracking Number

3 - **26067**

A. LOCATION OF SITE OR DISPOSAL SITE WHERE REMEDIATION WASTE WAS GENERATED:

1. Release Name/Location Aid: **VOLPE TRANSPORTATION CENTER**

2. Street Address: **55 BROADWAY**

3. City/Town: **CAMBRIDGE**

4. Zip Code: **02142-0000**

☒ 5. Check here if a Tier Classification Submittal has been provided to DEP for this disposal site:

☐ a. Tier 1A ☐ b. Tier 1B ☐ c. Tier 1C ☒ d. Tier II

6. If applicable provide the Permit Number: _____

B. THIS FORM IS BEING USED TO: (check one: B1-B4):

☒ 1. Submit a **Bill of Lading (BOL)** to transport Remediation Waste to Temporary Storage or a Receiving Facility.

Response Actions associated with this BOL (check all that apply):

- ☐ a. Immediate Response Action (IRA) ☐ e. Comprehensive Response Actions
☒ b. Release Abatement Measure (RAM) ☐ f.. Limited Removal Action (LRA):
(must be retained pursuant to 310 CMR 40.0034(6); can't be submitted via eDEP)
☐ c. Downgradient Property Status (DPS) ☐ g. Other _____
☐ d. Utility Release Abatement Measure (URAM)

☐ 2. Submit an Attestation of Completion of **Shipment to Temporary Storage** (Sections C, F and J are not required):

☐ 3. Submit an Attestation of Completion of **Shipment to a Receiving Facility** (Sections C, F and J are not required):

☐ 4. Certify that Remediation Waste Was **Not Shipped, and the Bill of Lading is Void.** (Sections C, D, E, and F are not required)

5. Date Bill of Lading submitted to the Department: _____ b. eDEP Transaction ID: _____
(mm/dd/yyyy)

6. Period of Generation Associated with this Bill of Lading **4/25/2011** to **4/26/2011**
(mm/dd/yyyy) (mm/dd/yyyy)

(All sections of this transmittal form must be filled out unless otherwise noted)

The Bill of Lading is not considered complete until the Attestation of Completion of Shipment is received by the Department.

C. DESCRIPTION OF WASTE AND WASTE SOURCE:

1. Contaminated Media /Debris (check all that apply):

- ☒ a. Soil ☐ b. Groundwater ☐ c. Surface Water ☐ d. Sediment ☐ e. Vegetation or Organic Debris
☐ f. Demolition/Construction Waste ☐ g. Inorganic Absorbent Materials ☐ h. Other: _____

2. Uncontainerized Waste (check all that apply):

- ☐ a. Inorganic Absorbent Materials ☐ b. Other: _____



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC112

Release Tracking Number

BILL OF LADING (pursuant to 310 CMR 40.0030)

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C. DESCRIPTION OF WASTE AND WASTE SOURCE (cont.):

3. Containerized Waste (check all that apply):

☐ a. Tank Bottoms/Sludges ☐ b. Containers ☐ c. Drums ☐ d. Engineered Impoundments

☐ e. Other:

4. Estimated Quantity: ☐ Tons ☒ Cu. Yds. ☐ Gallons

5. Contaminant Source (check one):

☐ a. Transportation Accident ☐ b. Underground Storage Tank ☐ c. Brownfields Redevelopment

☒ d. Other:

6. Type of Contaminant (check all that apply):

☐ a. Gasoline ☐ b. Diesel Fuel ☐ c. #2 Fuel Oil ☐ d. #4 Fuel Oil ☐ e. #6 Fuel Oil ☐ f. Jet Fuel

☐ g. Waste Oil ☐ h. Kerosene ☐ i. Chlorinated Solvents ☒ j. Urban Fill ☒ k. Other:

7. Constituents of Concern (check all that apply):

☐ a. As ☐ b. Cd ☐ c. Cr ☒ d. Pb ☐ e. Hg ☐ f. EPH/TPH ☐ g. VPH

☐ h. PCBs ☐ i. VOCs ☒ j. SVOCs ☐ k. Other:

8. If applicable, check the box for the Reportable Concentration Category of the site:

☒ a. RCS-1 ☐ b. RCS-2 ☐ c. RCGW-1 ☒ d. RCGW-2

9. Remediation Waste Characterization Documentation (check at least one):

☐ a. Site History Information ☐ b. Sampling Analytical Methods and Procedures ☒ c. Laboratory Data

☐ d. Field Screening Data ☐ e. Characterization Documentation previously submitted to the Department

i. Date submitted: ii. Type of Documentation:
(mm/dd/yyyy)

D. TRANSPORTER OR COMMON CARRIER INFORMATION:

1. Transporter/Common Carrier Name:

2. Contact First Name: 3. Last Name:

4. Street: 5. Title:

6. City/Town: 7. State: 8. Zip Code:

9. Telephone: 10. Ext: 11. Fax:



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC112

BILL OF LADING (pursuant to 310 CMR 40.0030)

Release Tracking Number

3 - **26067**

E. RECEIVING FACILITY/TEMPORARY STORAGE LOCATION:

1. Operator/Facility Name: **TITCOMB PIT LANDFILL**

2. Contact First Name: **JON**

3. Last Name: **SIMPSON**

4. Street: **23 SOUTH MARTIN ROAD**

5. Title:

6. City/Town: **AMESBURY**

7. State: **MA**

8. Zip Code: **01913-0000**

9. Telephone: **(857) 246-6800**

10. Ext: **201**

11. Fax:

12. Type of Facility: (Check one)

a. Temporary Storage

i. Period of Temporary Storage:

to
(mm/dd/yyyy)

(mm/dd/yyyy)

ii. Reason for Temporary Storage:

☐

b. Asphalt Batch/Hot Mix

☐

c. Landfill/Disposal

☐

d. Landfill/Structural Fill

☐

e. Landfill/Daily Cover

☐

f. Asphalt Batch/Cold Mix

☐

g. Thermal Processing

☐

h. Incinerator

☒

i. Other:

GRADING & SHAPING

13. Division of Hazardous Waste/Class A Permit Number:

14. Division of Solid Waste Permit Number: **W102250**

15. EPA Identification Number:

F. LSP SIGNATURE AND STAMP:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this submittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and 309 CMR 4.03(2), and (iii) the provisions of 309 CMR 4.03(3), to the best of my knowledge, information and belief, the assessment action(s) undertaken to characterize the Remediation Waste which is (are) the subject of this submittal for acceptance at the facility identified in this submittal comply with applicable provisions of 310 CMR 40.0000, and such facility is permitted to accept Remediation Waste having the characteristics described in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

1. LSP #: **9845**

2. First Name: **FAROOQ M**

3. Last Name: **SIDDIQUE**

4. Telephone: **(978) 298-5956**

5. Ext.

6. FAX: **(978) 298-5104**

7. Signature: **FAROOQ M SIDDIQUE**

8. Date: **5/6/2011**

(mm/dd/yyyy)

9. LSP Stamp:





Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC112

BILL OF LADING (pursuant to 310 CMR 40.0030)

Release Tracking Number

3 - **26067**

G. PERSON SUBMITTING BILL OF LADING:

1. Check all that apply: ☐ a. change in contact name ☐ b. Change of address ☐ c. change in person undertaking response actions
2. Name of Organization: **US DEPARTMENT OF TRANSPORTATION**
3. Contact First Name: **DAVID** 4. Last Name: **DUNCAN**
5. Street: **55 BROADWAY RTV-6** 6. Title:
7. City/Town: **CAMBRIDGE** 8. State: **MA** 9. Zip Code: **02142-0000**
10. Telephone: **(617) 494-2331** 11. Ext: 12. Fax:

H. RELATIONSHIP TO SITE OF PERSON SUBMITTING BILL OF LADING:

☐ Check here to change relationship

- ☒ 1. RP or PRP: ☒ a. Owner ☐ b. Operator ☐ c. Generator ☐ d. Transporter
☐ e. Other RP or PRP Specify:
- ☐ 2. Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c.21E, s.2):
- ☐ 3. Agency or Public Utility on a Right of Way (as defined by M.G.L. c.21E, s.5(j))
- ☐ 4. Any Other person Undertaking Response Actions: Specify Relationship:

I. REQUIRED ATTACHMENTS AND SUBMITTALS :

- ☐ 1. Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approvals issued by DEP or EPA. If the box is checked, you must attach a statement identifying the applicable provisions thereof.
- ☐ 2. Check here if any non-updatable information provided on this form is incorrect, e. g. property address. Send corrections to BWSC.eDEP@state.ma.us
- ☒ 3. Check here to certify that the LSP Opinion containing the material facts, data, and other information is attached.

J. CERTIFICATION OF PERSON SUBMITTING BILL OF LADING :

1. I, **DAVID S. DUNCAN**, attest under the pains and penalties or perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.
2. By: **DAVID S. DUNCAN** 3. Title:
4. For **US DEPARTMENT OF TRANSPORTATION** 5. Date: **5/6/2011**
(Name of person or entity recorded in Section H) (mm/dd/yyyy)



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC112

BILL OF LADING (pursuant to 310 CMR 40.0030)

Release Tracking Number

3 - **26067**

J. CERTIFICATION OF PERSON SUBMITTING BILL OF LADING (cont.) :

☐ 6. Check here if the address of the person providing certification is different from address recorded in Section H.

7. Street:

8. City/Town:

9. State:

10. Zip Code:

11. Telephone:

12. Ext:

13. Fax:

YOU ARE SUBJECT TO AN ANNUAL COMPLIANCE ASSURANCE FEE OF UP TO \$10,000 PER BILLABLE YEAR FOR THIS DISPOSAL SITE. YOU MUST LEGIBLY COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

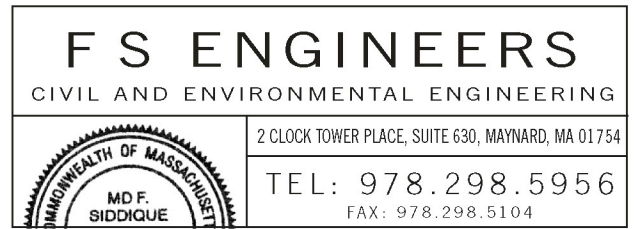
Date Stamp (MassDEP USE ONLY):

Received by DEP on

5/6/2011 2:34:25 PM

APPENDIX E

PUBLIC NOTIFICATION DOCUMENTATION



May 15, 2011

Mayor David Maher
Cambridge City Hall
795 Massachusetts Avenue
Cambridge, MA 02139

Re: Public Notification for:
Completion of a Release Abatement Measure and Response Action Outcome
55 Broadway, Cambridge, MA
MassDEP RTN 3-26067
FSE Project # 11-1395

Dear Mayor Maher:

On behalf of the USDOT/Volpe National Transportation Center, FS Engineers, Inc. (FSE) is hereby notifying you, in accordance with the Massachusetts Contingency Plan 310 CMR 40.1403(3)(d), that the following document was submitted to the Massachusetts Department of Environmental Protection (MassDEP), via eDEP (MassDEP's online filing system):

- Release Abatement Measure (RAM) Completion Statement and Response Action Outcome Statement Report

This document can be reviewed and downloaded online at the MassDEP website. Please do not hesitate to call our office if you have any questions or need additional information.

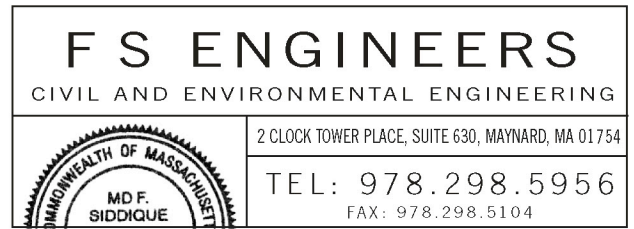
Sincerely yours,

FS ENGINEERS, INC.

Farooq Siddique, PE, LSP
Principal

Phone: 978-298-5956

Email: fsiddique@fsengrs.com



May 15, 2011

Chairperson
Cambridge Public Health Department
119 Windsor Street
Cambridge, MA 02139

Re: Public Notification for:
Completion of a Release Abatement Measure and Response Action Outcome
55 Broadway, Cambridge, MA
MassDEP RTN 3-26067
FSE Project # 11-1395

Dear Chairperson:

On behalf of the USDOT/Volpe National Transportations Center, FS Engineers, Inc. (FSE) is hereby notifying you, in accordance with the Massachusetts Contingency Plan 310 CMR 40.1403(3)(d), that the following document was submitted to the Massachusetts Department of Environmental Protection (MassDEP), via eDEP (MassDEP's online filing system):

- Release Abatement Measure (RAM) Completion Statement and Response Action Outcome Statement Report

This document can be reviewed and downloaded online at the MassDEP website. Please do not hesitate to call our office if you have any questions or need additional information.

Sincerely yours,

FS ENGINEERS, INC.

Farooq Siddique, PE, LSP
Principal

Phone: 978-298-5956

Email: fsiddique@fsengrs.com

APPENDIX F

METHOD 3 RISK CHARACTERIZATION
BY H. STRAUSS ASSOCIATES, INC.

Phase II Risk Assessment
Volpe National Transportation Systems Center
US Department of Transportation
55 Broadway
Cambridge, MA

1. Introduction

This report provides an assessment of the potential risks to human health, the environment, safety and public welfare associated with contamination in the playground and grassy area in the northwest corner of the Volpe National Transportation Systems Center (Volpe Center), located at 55 Broadway, Cambridge, MA (the Site, MA DEP RTN: 3-26067). The assessment addresses potential risks posed by exposure to the contamination in the soil, groundwater and ambient air at the Site under both current conditions and those in the foreseeable future. The risk assessment has been prepared by Dr. Harlee Strauss of H. Strauss Associates, Inc. (HSAI) at the request of FS Engineers, Inc (FSE) on behalf of the US Department of Transportation Volpe Center.

The risk assessment has been conducted in accordance with the most recently revised regulations in the Massachusetts Contingency Plan (310 CMR 40.0000) and the most recent risk assessment guidance and policies provided by the MA DEP (July 1995, April 1996, May 2001, June 2001, May 2002, October 2002a,b, August 2007, February 2008, June 2008, September 2008). The hazard identification and exposure assessment are based on available contaminant data collected by FSE as provided in reports, laboratory analyses, and discussions with personnel at FSE. It is also based on a visit to the Site by Harlee Strauss, Ph.D. on October 8, 2008. The risks to human health, the environment, public welfare and safety are evaluated using Method 3 of the Massachusetts Contingency Plan (MCP).

1.1 Site Location and Description

This section presents a brief description of the Site as relevant to risk assessment. Information was obtained from the Supplemental Site Investigation dated May 27, 2008, the Release Abatement Measure Plan dated September 26, 2008, and the Phase I Initial Site Investigation and Tier Classification, all prepared by FS Engineers.

The Site is located in the northeastern portion of the property located at 55 Broadway in Cambridge, MA that is occupied by the US Department of Transportation Volpe Center. The property is in a commercial area of Cambridge, Massachusetts, and consists of one multistoried office building, three additional buildings, parking lots, landscaped areas and open lawn areas.

The Site consists of the Child Care Center playground and an adjacent open lawn/grassy area. The total area is approximately one acre. The playground is surrounded by a four foot high chain link fence with locking gates. A chain link fence also bisects the

playground to separate the preschool playground to the north from the toddler 1/infant playground to the south. The preschool playground is covered by a chipped rubber surface. The toddler 1/infant playground has an area covered by a rubber mat as well as a gazebo and a grassy area. The playground has not been used since the discovery of contamination at the Site.

The topography of the Site is flat. The depth to groundwater in the area is approximately 7 feet below ground surface. It is most likely to flow towards the east and discharge into the Charles River. However, when FSE measured the groundwater flow direction in June 2007, the flow was towards the northwest. FSE suggested the reason was dewatering at a large construction site in that direction across Potter Street from the Site (FSE, July 2007). The Broad Canal, a part of the Charles River is the nearest water body and located approximately 1000 feet to the southeast. The groundwater at the Site is classified as GW-3 as required of all groundwater in the Commonwealth. The groundwater does not meet the requirements to be classified as GW-1. There are no occupied buildings within 30 feet of the monitoring wells, thus the groundwater is not classified as GW-2.

1.2 Site History

The area of the playground was previously occupied (since 1900) by the Seavay Manufacturing Company, Boston Blacking and Chemical Company, University Sign Co/Neon Products, Inc. and Badger Light. Cambridge Gas Light Co. was formerly located to the north, across Potter Street. This was a former manufactured gas plant that operated from the early 1900's to the late 1960s; it is the likely source of the coal tar encountered on the Site.

Workers installing playground equipment discovered coal tar in post hole excavations on July 18, 2006. In August 2006, approximately 170 tons of contaminated soil was removed from the northern half of the playground, the portion used by the preschoolers. The excavation was to depths of 3-5 feet. In October 2008, the southern portion of the playground was excavated to a depth of 4 and backfilled with clean fill. However, pockets/seams of coal tar remain at depths below 4 feet. In addition, based on visual observations during the excavation, coal tar also remains beneath the surface in areas adjacent to the playground towards the south.

1.3 Future Use of the Site

The Site is anticipated to remain in use as a playground and grassy field for the foreseeable future. The fenced area is assumed to remain in use as a play area for infants, toddlers and preschoolers. The grassy area may be used as a playing field by preschoolers, elementary school children, and/or adult workers. Normal maintenance activities are also assumed to be conducted in the grassy area such as mowing and raking. Activities that require earth moving, such as landscaping (including major plantings), underground utility installation and maintenance, and construction of a new building are evaluated as potential future activities.

2.0 Hazard Identification

The hazard identification is based on the contaminants detected above background concentrations at the Site. Figures 2-1 to 2-3 are sample location plan for soil samples collected during the site investigations conducted by FSE. The results of the sampling are discussed below by environmental medium, with soil divided between shallow surface soil (0-4"), deeper surface soil (4" - 3 feet) and subsurface soil (>3 feet).

2.1 Surface Soil

Under the MCP, soil at depths between 0 and 3 feet is classified as surface soil. However, activities that lead to exposure to shallow surface soil (first few inches) differ from those that lead to exposure to deeper surface soil (e.g., 4 inches to 3 feet). Because of this difference, and the different depths of soil sampled in various sampling campaigns at the Site, shallow and deeper surface soils are described and evaluated separately. The surface soil evaluated in this assessment is in the grassy area and under trees. The surface soil in the southern part of the fenced playground was removed (excavation to 4 feet) as part of the current remediation of this Site. Surface soil in the northern portion of the fenced playground had been excavated to depths of 3-5 feet under a previous remediation.

Shallow Surface Soil

Shallow surface soil (depth: 3 - 4 inches below ground surface) was collected in a grid pattern from 13 locations in the grassy area along with one location near an oak tree along Potter Street (Figure 2-1). Much of the grassy area is overlain with 3 – 6 inches of loam/topsoil; coal, wood, brick, gravel and other non-native materials were found in core samples at deeper depths. The soil samples were tested for extractable petroleum hydrocarbons (EPH) and target polycyclic aromatic hydrocarbons (PAHs), lead, arsenic, and cyanide. The results of these analyses are summarized in Table 1-1. The table is organized as follows: The left hand column lists the analytes, organized by the type of analysis. The subsequent columns summarize the sample depth, date, and concentrations detected. All results are presented in mg/kg which is equivalent to ppm.

Table 2-2 summarizes the shallow surface soil data in Table 2-1 in terms of frequency of detection (number of times detected and sought), minimum concentration detected, maximum concentration detected, and arithmetic mean of the samples. Table 2-2 also lists generic background concentrations published in MCP (May 2002) as guidance for risk characterization. If an analyte was not detected in all samples, the minimum concentration is listed as less than (<) the detection limit. Concentrations below the limits of detection were included in the calculation of the mean by assuming the sample contained a concentration of ½ the detection limit. Means were not calculated (NC) for chemicals with a low frequency of detection. The final two columns list the generic background concentrations identified by MA DEP (May 2002) for PAHs, arsenic, and

lead for “natural” soil and in soil containing coal ash or wood ash associated with fill material.

A comparison of the arithmetic mean concentrations of PAHs with the generic background for natural soils shows that none of the mean concentrations exceed this background concentration. Arsenic concentrations are also below natural soil background. The mean concentration of lead is above natural background, but not above its generic concentration in soil with coal ash and other materials in the fill, which was observed at this Site in the soil borings. Several individual soil samples have PAH concentrations that exceed generic background for natural soil, but none exceed generic background for soils with coal ash and other fill materials. Based on these comparisons, it is concluded that PAHs, arsenic and lead are not contaminants of concern in shallow surface soil (0-4”).

The EPH fraction, C11-C22 aromatics, was the only EPH fraction detected in shallow surface soil. The mean concentration detected, 53 mg/kg, is only twice the detection limit, given as the reportable detection limit (RDL, which could also be called the practical quantitation limit, PQL). The highest concentration detected is less than three times the limit of detection. The frequency of detection is high (13/14), and the range of concentrations across the Site is small; approximately a factor of 3. Because of the low concentrations detected, the uniformity of the detections across the site, and the lack of any other PAHs or EPH fractions detected in surface soil, the C11-C22 aromatics are considered to be at a site specific background concentration. As a point of comparison, the arithmetic mean at the Site, 53 mg/kg, is also very low compared to its MCP Method 1 Standard of 1000 mg/kg.

Deeper Surface Soil

Surface soil at depths of 12-36 inches was sampled from soil borings installed in May 2007. The location of these samples is shown in Figure 2-2. The samples were analyzed for EPH and target PAHs, volatile petroleum hydrocarbons (VPH) and target analytes, and the inorganics arsenic and lead. Soil from four of these samples remain on the Site; the others were excavated in October 2008 in accordance with the Remedial Abatement Measure Plan submitted by FSE (September 2008). The analytical results obtained from these four samples are presented in Table 2-3. Table 2-4 summarizes the deeper surface soil data in Table 2-3 in terms of frequency of detection (number of times detected and sought), minimum concentration detected, maximum concentration detected, and arithmetic mean of the samples. Table 2-4 also lists generic background concentrations published in MCP (May 2002) as guidance for risk characterization. Both tables are organized in a similar fashion as Tables 2-1 and 2-2.

As shown in Table 2-4, a comparison of the arithmetic mean concentrations of PAHs with MA generic background concentrations of PAHs in soil with coal ash (coal, brick and other materials were reported in the boring logs, FSE July 2007) indicates anthracene, fluoranthene, chrysene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene exceed their generic background concentrations,

although none by more than a factor of two. However, PAHs are typically released as a mixture, so the 15 target PAHs detected in deeper surface soil are all included as contaminants of concern for deeper surface soils.

Arsenic and lead were detected above their generic soil background concentrations for natural soil, and arsenic is above its generic background concentration for soil with coal ash. Both arsenic and lead are included as contaminants of concern for deeper surface soil.

The EPH fraction C19-C36 aliphatics was detected in three of four samples and the EPH fraction C11-C22 aromatics was detected in all four samples. MADEP has not published generic background concentrations for these fractions in soils. C19-C36 aliphatics were not detected in shallow surface soil samples and the mean concentration of C11-C22 aromatics was 54 mg/kg in shallow surface soil compared to 428 mg/kg in the deeper surface soils. Both of these EPH fractions are considered contaminants of concern for deeper surface soils.

VPH fractions C5-C8 aliphatics and C9-C10 aromatics were detected in 2 and 3 of the three samples in which they were tested, respectively. However, the VPH fractions were detected at concentrations less than twice their RDL, and lower than reportable concentrations under the MCP. VPH target analytes benzene, toluene, and xylenes were detected in 1 of the three samples at concentrations approximately 3 times the RDL and lower than their reportable concentrations under the MCP. Naphthalene was reported in all three samples tested by VPH methodology with a mean concentration at its generic background concentration for natural soil. VPH fractions and benzene, toluene, and xylenes are not considered contaminants of concern. Naphthalene is also evaluated in EPH methodology as a target analyte, and is included as a COC for deeper surface soil.

2.2 Subsurface Soil

Confirmation samples taken from the bottom of the remediation excavation in the southern portion of the playground (toddler 1/infant area) represent subsurface soil at a depth of four feet. The location of these samples is shown in Figure 2-3. The top four feet of soil is clean fill. Subsurface soil at depths of 6-8 feet was sampled from soil borings installed in May 2007. All subsurface soil samples were analyzed for EPH and target PAHs; two confirmation samples were also tested for arsenic and lead. The analytical results obtained from subsurface soils are presented in Table 2-5. Table 2-6 summarizes the subsurface soil data in Table 2-5 in terms of frequency of detection (number of times detected and sought), minimum concentration detected, maximum concentration detected, and arithmetic mean of the samples. Table 2-6 also lists generic background concentrations published in MCP (May 2002) as guidance for risk characterization. Both tables are organized in a similar fashion as Tables 2-1 and 2-2.

As shown in Table 2-6, a comparison of the arithmetic mean concentrations of PAHs with MA generic background concentrations of PAHs in soil with coal ash (coal, brick

and other materials were reported in the boring logs, FSE July 2007) indicates that 16 of the 17 target PAHs are well above their generic background concentrations. The exception is acenaphthylene which was detected only once at just above its detection limit. All three EPH fractions are considered contaminants of concern because of the concentrations in which they were detected. EPH fraction C11-C22 aromatics was detected with a high frequency (18/20), while EPH fraction C9-C18 aliphatics was detected only once in 20 samples.

Lead was detected above its generic background concentration in natural soil, but below its generic background in soils with coal ash. Arsenic concentrations in the subsurface soil were below generic background, in contrast with the reported elevated concentrations in soil at depths between 1-3 feet. Both lead and arsenic are retained as contaminants of concern in subsurface soil.

2.3 Groundwater

Three monitoring wells were installed at the Site. Groundwater from each of them was sampled in June 2007 and analyzed for EPH and EPH target PAHs. No EPH was detected. Acenaphthene was detected in two of the samples (maximum concentration 10.4 ug/L); although the samples were not filtered prior to analysis and the acenaphthene could have been associated with soil. Because acenaphthene was the only PAH detected, and it was detected with the lowest frequency of the target PAHs in soil, including the similarly water soluble naphthalenes, it is not considered a Site-related contaminant of concern in the groundwater. As a point of comparison, however, the MCP Method 1 GW3 standard for acenaphthene is 6000 ug/L.

2.4 Air

Ambient air in the playground was sampled twice in response to concern about odors during a large excavation nearby. The first round of sampling, conducted on January 12, 2007, was a 7-8 hour sample collected in a SUMMA canister and analyzed for organic compounds by method TO15. Toluene (3.2 ug/m^3) was the only analyte detected. The second round of sampling, conducted on April 6, 2007, included 8 hour samples collected into SUMMA canisters and analyzed by methods TO15, TO13A (modified), and APH (air phase petroleum hydrocarbons). The second round of sampling was capable of detecting a wider range of compounds including those anticipated from volatile emissions of coal tar. The TO15 analysis detected 7 compounds commonly detected in ambient air, acetone, 2 butanone, dichlorodifluoromethane, ethanol, methylene chloride, isopropanol and toluene. Of these, only toluene has been detected in soil at the site. The TO13A (modified) analysis detected naphthalene (0.23 ug/m^3) and phenanthrene (0.0074 ug/m^3). The APH analysis detected benzene (0.88 ug/m^3) and toluene (1.9 ug/m^3). Benzene was not detected in soil or groundwater at the Site. Naphthalene and phenanthrene were detected in Site soils, but they are also combustion products and these analytes are commonly detected in ambient air in an urban area with traffic and construction

equipment. For example, toluene concentrations in suburban and urban air often range between 5-25 ug/m³ with emissions related to gasoline as the largest source (ATSDR 2000). ATSDR (2005) cites a median concentration of naphthalene in 11 urban areas as 0.94 ug/m³. ATSDR (1995) does not cite ambient air concentrations for phenanthrene, but the concentration reported at the Site is within the range cited for other PAHs in ambient air in urban samples. Therefore, the air concentrations of toluene, naphthalene and phenanthrene detected at the Site are consistent ambient air background. There are no contaminants of concern in ambient air.

2.5 Identification of Contaminants of Concern

The previous subsections describe the soil, groundwater, and air sampling data from the Site in detail. No contaminants of concern were identified in shallow surface soil (0-4”), groundwater, or air. All three EPH fractions and 16 of the 17 target PAHs have been identified as contaminants of concern in deeper surface soil and/or subsurface soil. Arsenic and lead are also included as contaminants of concern. Acenaphthylene is not considered a contaminant of concern because it was detected infrequently (1/20, subsurface soil, 1/4 deeper surface soil) and at a concentration just above its detection limit.

3.0 Selecting a Risk Assessment Method

The risk is characterized using Method 3 of the Massachusetts Contingency Plan.

4.0 Dose Response Assessment

The dose-response assessment defines the relationship between the dose of the chemical taken into the body and the probability that an adverse effect will result from that dose. Two different types of dose-response relationships are commonly associated with environmental contaminants: threshold and low-dose linear.

Threshold relationships are generally assumed for noncarcinogenic effects. A threshold relationship assumes there is a dose below which no adverse effect will occur. The US EPA and other organizations have developed benchmark doses, often called reference doses (RfDs), to quantify the toxicity of threshold effects for oral and dermal exposures. Benchmark concentrations, called reference concentrations (RfCs), are used to quantify risk from inhalation exposures.

Reference doses and reference concentrations are associated with different time periods of exposure, most usually chronic exposure (7 years to lifetime) and subchronic exposure (2 weeks to 7 years). The US EPA (IRIS) defines a chronic RfD as “an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime.” A subchronic RfD is an

estimate of a daily exposure level likely to be without an appreciable risk of deleterious effects during an exposure period of 2 weeks to seven years. A subchronic RfD is always greater than (often 10 fold) or equal to a chronic RfD. In other words, it is assumed that for shorter periods of time people can be exposed to higher concentrations without deleterious effects. Reference concentrations are defined similarly.

Reference doses for a specified time period (e.g., chronic or subchronic) can be compared to the average daily dose (ADD) estimated for the comparable time period. Similarly, reference concentrations for a specified time period can be compared to average daily exposures (ADEs) estimated for the comparable period. The ratio of the lifetime average daily dose (exposure) and the chronic reference dose (concentration) is called the chronic hazard index (HI). The ratio of the daily dose (exposure) averaged over a shorter period of time, such as a year, with the subchronic reference dose is called the subchronic HI.

Carcinogenic materials are assumed to have a linear response curve at low doses (unless there is convincing data showing another dose-response curve). In other words, a finite risk of a carcinogenic response is associated with all exposures. The US EPA and MA DEP utilize a generally conservative (i.e., more likely to overestimate than underestimate potential risks) method for summarizing the dose-response information for carcinogens using a "slope factor" for oral exposures. The units of a slope factor are inverse dose: $(\text{mg/kg-day})^{-1}$. For inhalation exposures, dose-response information is often summarized in terms of an inhalation unit risk, which has units of inverse concentration: $(\text{ug/m}^3)^{-1}$.

The slope factors and subchronic RfDs used in the risk assessment are those incorporated into the most current Massachusetts shortforms (Vlookup Version v0808) and summarized in Table 4-1 below. Chronic RfDs were not used in this risk assessment as no complete exposure pathways that would result in chronic exposure were identified (see section 5 below).

Table 4-1
Dose Response Factors

	Oral	Inhalation	Subchronic	Subchronic
	CSF	CSF	Oral RfD	Inhalation RfD
	(mg/kg-day) ⁻¹	(mg/kg-day) ⁻¹	mg/kg-day	mg/kg-day
Aliphatics C19 to C36	0	0	6	0
Aromatics C11 to C22	0	0	0.3	0.14
Naphthalene	0	0	0.2	0.00
Methylnaphthalene, 2-	0	0	0.004	0.14
Acenaphthene	0	0	0.6	0.14
Fluorene	0	0	0.4	0.14
Phenanthrene	0	0	0.3	0.14
Anthracene	0	0	3	0.14
Fluoranthene	0	0	0.4	0.14
Pyrene	0	0	0.3	0.14
Benzo(a)anthracene	0.73	0.73	0.3	0.14
Chrysene	0.073	0.073	0.3	0.14
Benzo(b)fluoranthene	0.73	0.73	0.3	0.14
Benzo(k)fluoranthene	0.073	0.073	0.3	0.14
Benzo(a)pyrene	7.3	7.3	0.3	0.14
Indeno(1,2,3-cd)pyrene	0.73	0.73	0.3	0.14
Dibenzo(a,h)anthracene	7.3	7.3	0.3	0.14
Benzo(g,h,i)perylene	0	0	0.3	0.14
Arsenic	1.5	15.05	0.0003	0.00
Lead	0	0	0.00075	0.00

5.0 Exposure Assessment

The exposure assessment and risk characterization are based on deeper surface soil and subsurface soil data for the Site described in the Hazard Identification section of this report and exposure pathways identified during a site visit on October 8, 2008 by Harlee Strauss, Ph.D.

5.1 Exposure Scenarios/Pathways

Six exposure scenarios have been identified at the Site based on current use or those in the foreseeable future. These scenarios are summarized in Table 5-1 below. Of the identified scenarios, three are incomplete because no contaminants were identified in shallow surface soil in the area outside the playground and exposure to soils deeper than 4" is not associated with the activity in the scenario. The surface soil inside the

playground has been replaced with clean fill. Activities covered in these scenarios are: 1) children playing in the fenced play areas and adults supervising the children, 2) children and adults playing in the grassy area, and 3) maintenance workers mowing and raking the grassy area. The three scenarios that are considered complete involve exposure to deeper surface soil and subsurface soil: landscaping/planting, maintenance or installation of underground utilities, and construction of a foundation for a new building. The receptors in these complete exposure scenarios are adult workers.

Table 5-1
Soil Exposure Scenarios

Scenario/Location	time-frame	Media	Activity	Receptors	Complete?	Comments
Recreation in the fenced playground	current future	shallow surface soil	playing while at center	young children (6 mo-5 yrs) adult day care workers	no	No contaminated surface soil remains on-site
Playing in the grassy area	current future	shallow surface soil	playing ball, tag, other games with no digging	children and adults	no	No contamination in the shallow surface soil (0-4")
Routine maintenance of grassy area	current future	shallow surface soil	mowing, seeding etc	adults	no	No contamination in the shallow surface soil (0-4")
Landscaping grassy area	current future	surface soil	planting, activities requiring digging	adults	yes	exposure duration will be short, 1-2 days
Utility installation/maintenance, anywhere on site	future	surface soil, subsurface soil	digging trench	adult workers	yes	exposure duration will be short, less than 2 weeks
Construction of new building	future	surface soil, subsurface soil	digging foundation	adult workers	yes	evaluated

5.2 Exposure Pathways and Dose Calculations

Exposure to deeper surface soil and subsurface soil is evaluated based on a construction worker scenario that includes exposure doses from dermal contact, inadvertent ingestion, and inhalation of fugitive dust. The exposure assumptions of a construction worker exposure scenario will be protective of utility workers and landscapers who are assumed to have less frequent and less intense contact with soil.

The exposure and risk from soil were calculated using the MA DEP shortform for construction workers available on the MADEP website (<http://www.mass.gov/dep/service/compliance/riskasmt.htm>). The contaminants of concern were identified in Section 2.5. They are the three EPH fractions: aliphatics C9-C18, aliphatics C19-C36, and aromatics C11-C22, 16 target PAHs (listed in Tables 4-1 and 6-1), arsenic and lead. The exposure point concentrations are the arithmetic means of the subsurface soil shown in Table 2-6. These concentrations are higher than those of the deeper surface soil, and their use without accounting for the subsurface soil exposure will overestimate exposure and risk. However, there were also pockets/seams of coal tar observed in two borings, and these are not represented in the analytical data. The presence of coal tar will enhance potential exposure and risk to carcinogenic PAHs.

Details of the exposure calculation, including the equations and the model parameters, are provided in the spreadsheets associated with the MA DEP shortform that are attached to this report as Appendix A. Briefly, the construction worker scenario includes exposure via ingestion of contaminated soil (100 mg/day), inhalation of dust from the site ($PM_{10} = 60 \text{ ug/m}^3$) at an inhalation rate (60 L/min) based on heavy exertion, and dermal contact with dirt covering approximately hands, face, and forearms. It assumes an exposure frequency of 5 days/week for 6 months. As a point of comparison, the MA DEP default exposure frequency for a utility worker is 1 day/year.

6.0 Risk Characterization

This assessment characterizes risk using Method 3 under the MCP. As discussed in section 5.1, risks from exposure soil below shallow surface soil were calculated using the MA DEP shortform for construction workers.

6.1 Non-cancer Risk

Noncancer risks are characterized by comparing the average daily dose (ADD) to a health based reference dose (RfD) which was described in section 4. For the construction workers, a subchronic hazard index is calculated as the exposure duration is 6 months which is considered a subchronic time period.

$$\text{Subchronic Hazard Index} = \text{ADD}/\text{Subchronic RfD}$$

The total Subchronic HI is calculated as the sum of the HIs for all the contaminants of concern.

The hazard index approach to characterizing non-cancer risks assumes that there is a level of exposure (RfC or RfD) below which adverse effects are unlikely, even for a susceptible population. Thus, an HI of less than one represents a situation where adverse effects are unlikely and under the MCP represents a level of no significant risk. HIs

above one indicate a level of concern, and the higher the HI, the higher the level of concern. However, an HI above 1 is not a prediction that an adverse effect will occur.

Table 6-1, which is the output of the construction worker soil short form (CW-1), shows that the HI(all chemicals) is 0.7 which is less than 1. Thus, there is no significant non-cancer risk associated with exposure to deeper surface soils and subsurface soils at this Site for adults based on any worker scenario: construction, utility, landscaper.

6.2 Cancer Risks

Cancer risk is characterized in terms of excess lifetime cancer risk (ELCR), which is the probability that, over a lifetime (not each year), exposure from the Site will produce an excess case of cancer over the background level of cancer. For each contaminant, each route of exposure, each exposure scenario, and for appropriately combined exposure scenarios calculated cancer risks are compared to the MCP benchmark excess lifetime cancer risk of 1×10^{-5} .

The excess lifetime cancer risk (ELCR) is calculated using the equation:

$$\text{ELCR} = \text{LADD} * \text{cancer slope factor (CSF)}$$

The chemical specific cancer slope factors used in the calculation for construction workers are listed in Table 4-1. The differences in absorption due to different routes of exposure (e.g., inhalation, dermal, ingestion) are accounted for by the use of relative absorption factors. The LADD (average daily dose averaged over a lifetime) was calculated using the exposure parameters and equations described in Section 5, and the assumption that the exposure occurred for 6 months of a 70 year lifetime. The details of this calculation are provided in Appendix A, the construction worker shortform spreadsheets.

Table 6-1, which is the output of the construction worker soil short form (CW-1), shows that the ELCR(all chemicals) is 8×10^{-6} , which is less than the MCP benchmark of 1×10^{-5} . Thus, there is no significant cancer risk associated with exposure to deeper surface soils and subsurface soils at this Site for adults based on any worker scenario: construction, utility, landscaper.

6.3 Uncertainty of the Risk Characterization

There are many uncertainties associated with all risk characterizations, including the measurement of environmental contaminants, the representativeness of the measured environmental concentrations, exposure assumptions such as soil ingestion rates and dermal absorption parameters, and the toxicity data that are characterized by dose response factors. The dose response data are often based on animal data extrapolated to humans, and do not reflect interactions that may occur among multiple contaminants.

One uncertainty particular to this risk characterization is the presence of seams of coal tar that was reported in two of the boring logs (B5, B10), and was observed to extend beyond the excavation of the southern portion of the fenced playground into the subsurface of the grassy areas (near B5). The coal tar is not fully reflected in the analytical results because pure coal tar generally is not analyzed as part of soil contamination. This uncertainty will result in an underestimate of the risks to workers coming into contact with subsurface soil. It does not have an impact on current use scenarios involving children, daycare workers, and those who conduct routine lawn maintenance.

7.0 Risk of Harm to the Environment

There is no contamination of the surficial soil. None of the COCs at the site - EPH and its target PAH analytes, arsenic and lead – bioaccumulate in soil organisms. No contaminants of concern were identified in groundwater. Therefore, it is concluded that this Site does not pose a significant risk of harm to the environment.

8.0 Risks to Safety and Public Welfare

No safety risks related to Site contamination have been identified at this Site. There are no drums or corroded containers or threat of fire or explosion related to Site contamination. Thus, it is concluded that there are no risks of harm to safety associated with this Site.

Risks to public welfare include odors and contaminant concentrations that exceed their upper concentration limits (UCLs). Table 8-1 lists the UCL in soil, and the mean and maximum concentration of each contaminant of concern in deeper surface soils and subsurface soils. For the deep surface soils, UCLs were not exceeded for the mean or maximum concentrations of any contaminant of concern. For subsurface soils, all of the mean concentrations are below the appropriate UCL, but the maximum concentrations of 6 contaminants were detected at or above their UCL: C11-12 aromatics, phenanthrene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene. Exceedances were found in two samples, both located at depths of 6-8 feet in the vicinity of the gazebo in the southern portion of the playground. The observation of coal tar in the subsurface is also considered to be a risk to public welfare.

8.0 Summary and Conclusions

This report characterizes the risks to human health, the environment, safety, and public welfare associated with soil, groundwater and ambient air at the playground and grassy area of the Volpe TSC Day Care Facility at 55 Broadway, Cambridge, MA. No contaminants above anticipated background concentrations were detected in shallow surface soil (0-4”) and ambient air. In contrast, deeper surface soils and subsurface soils had elevated concentrations of extractable petroleum hydrocarbons, target PAHs, arsenic

and lead. Coal tar was observed in several borings and in the sidewalls of excavations. A Method 3 risk assessment was conducted.

The exposure analysis identified complete exposure pathways to utility workers, landscapers and construction workers. The construction worker exposure scenario was used as a highly conservative representation of the other workers. The future use of this site as a residential area is not foreseen, and this use was not evaluated.

The human health exposure and risk to construction workers was quantified using the MA DEP short form which predicted an excess lifetime cancer risk of 8×10^{-6} and a subchronic hazard index of 0.7. Both the cancer risk and noncancer hazard are below the benchmarks established for significant risk under the MCP. Among the uncertainties associated with the exposure and risk estimate is the presence of coal tar, which is likely not to be fully accounted for in the analytical results. Thus, while the Site does not present a significant risk to human health under current or foreseeable future conditions based on MCP criteria, caution should be exercised whenever soils deeper than 6 inches is accessed.

There are no significant risks of harm to the environment and to public safety.

Two samples from depths of 6-8 feet contained EPH or target PAH analytes above their UCL. Coal tar was observed in one of these soil borings, in another soil boring, and in the southern sidewall of the excavation in the southern portion of the playground. There is a significant risk of harm to public welfare due to the elevated EPH and PAH concentrations and the residual coal tar in the deeper surface and subsurface soils.

9.0 References

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**Figure 2-1
Surface Soil Sample Locations**

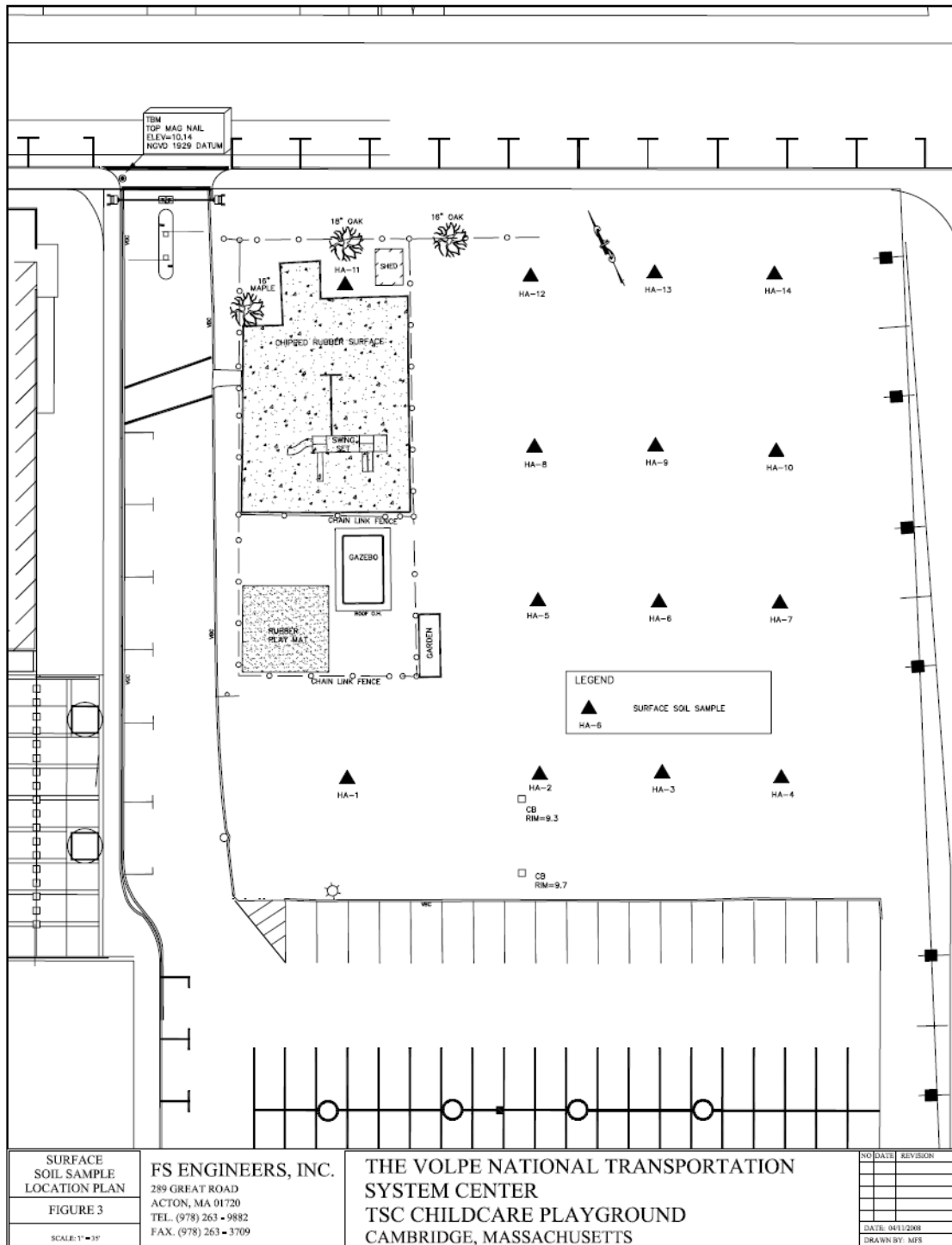


Figure 2-2
Soil Boring Locations

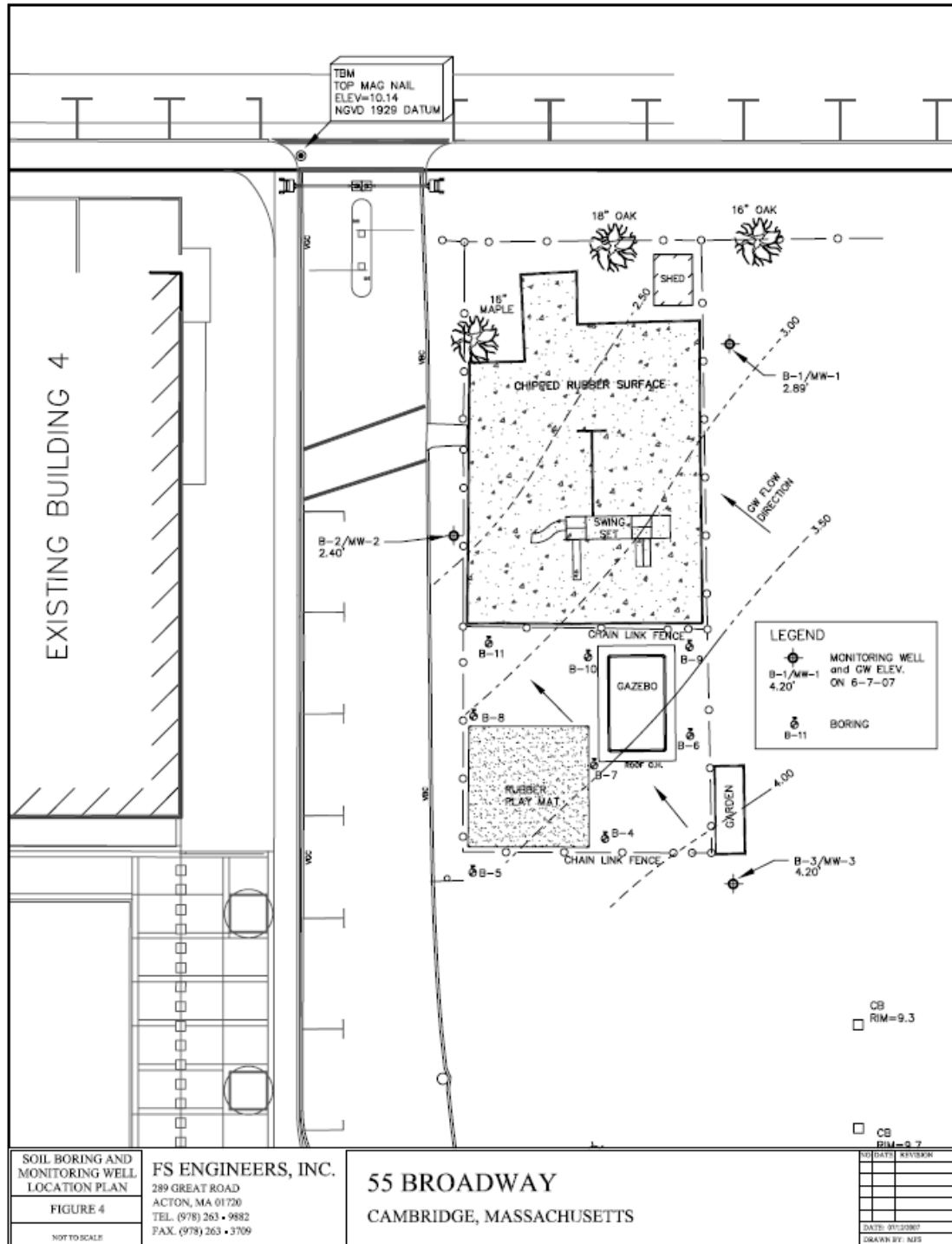
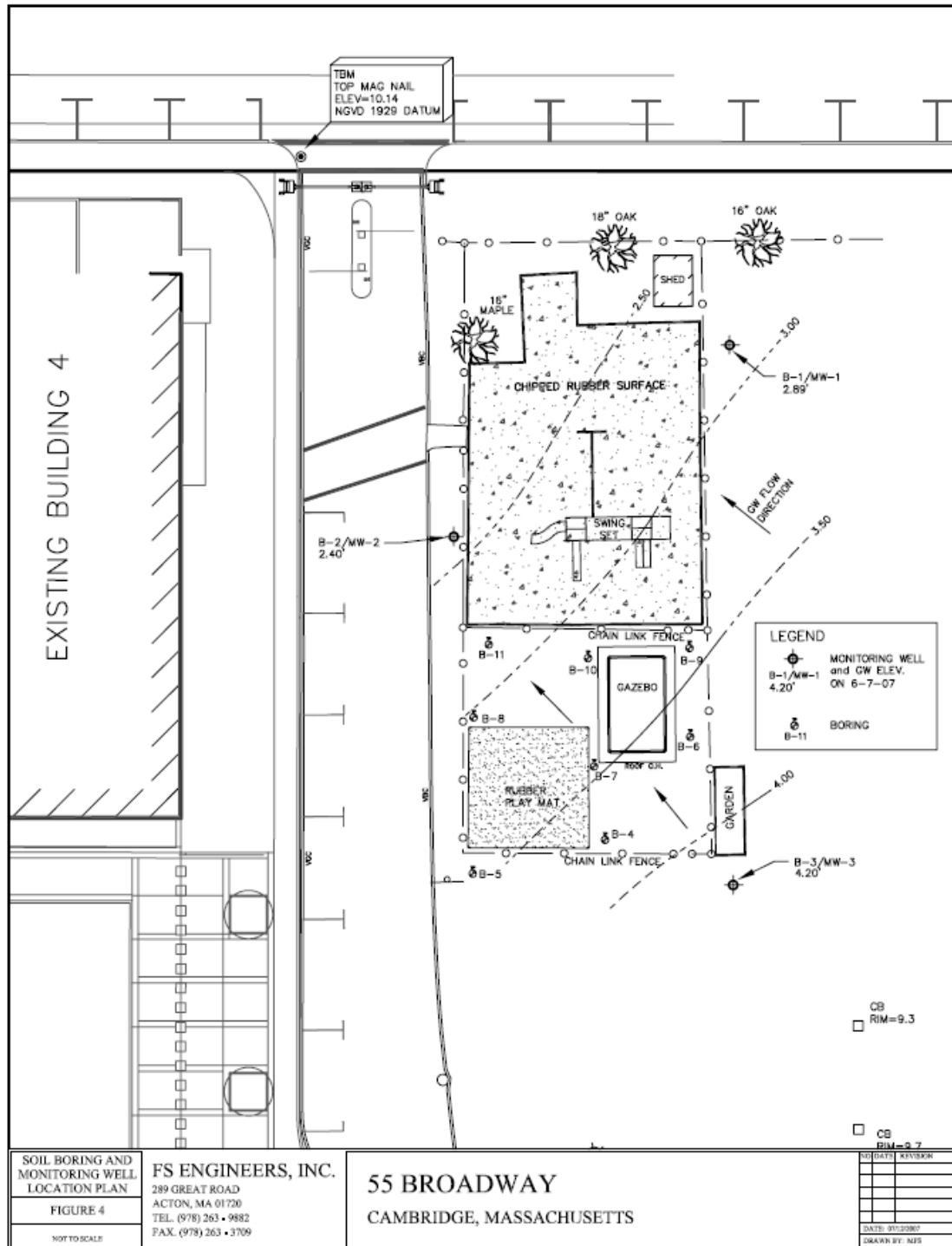


Figure 2-3
Subsurface Soil Locations (Confirmation Samples)



TABLES FROM EXCEL FILE

APPENDIX A

Construction Worker Shortform Spreadsheets

Method 3 Risk Assessment for Chemicals in Soil - Construction Worker Shortform 2008 (sf08cw)

Index

Tab

EPCs Table CW-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Associated risks are shown to the right.

C Eq Table CW-2: Equations to calculate cancer risks.

NC Eq Table CW-3: Equations to calculate noncancer risks.

Exp Table CW-4: Definitions and exposure factors.

Chem Table CW-5: Chemical-specific data.

Spreadsheets designed by Andrew Friedmann, MassDEP

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Construction Worker - Soil: Table CW-1
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 08-08

Vlookup Version v0808

ELCR (all chemicals) = #REF!

HI (all chemicals) = 7E-01

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR	ELCR	ELCR	ELCR	ELCR inhalation pulmonary	ELCR _{total}	Subchronic				HQ _{total}
		ingestion	dermal	inhalation GI				HQ _{ing}	HQ _{derm}	HQ _{inh-GI}	HQ _{inh}	
Aliphatics C19 to C36	290	#REF!	#REF!	#REF!			#REF!	6.0E-05	6.0E-05	1.5E-06		1.2E-04
Aromatics C11 to C22	1621	#REF!	#REF!	#REF!			#REF!	2.4E-03	6.7E-03	6.2E-05	1.2E-04	9.3E-03
Naphthalene	145	#REF!	#REF!	#REF!			#REF!	3.2E-04	9.0E-04	8.3E-06	1.8E-03	3.0E-03
Methylnaphthalene, 2-	59	#REF!	#REF!	#REF!			#REF!	6.5E-03	1.8E-02	1.7E-04	4.4E-06	2.5E-02
Acenaphthene	35	#REF!	#REF!	#REF!			#REF!	2.6E-05	7.2E-05	6.7E-07	2.6E-06	1.0E-04
Fluorene	64	#REF!	#REF!	#REF!			#REF!	7.1E-05	2.0E-04	1.8E-06	4.8E-06	2.8E-04
Phenanthrene	780	#REF!	#REF!	#REF!			#REF!	1.2E-03	3.2E-03	3.0E-05	5.8E-05	4.5E-03
Anthracene	244	#REF!	#REF!	#REF!			#REF!	3.6E-05	1.0E-04	9.3E-07	1.8E-05	1.6E-04
Fluoranthene	641	#REF!	#REF!	#REF!			#REF!	7.1E-04	2.0E-03	1.8E-05	4.8E-05	2.8E-03
Pyrene	638	#REF!	#REF!	#REF!			#REF!	9.4E-04	2.6E-03	2.4E-05	4.8E-05	3.7E-03
Benzo(a)anthracene	396	7.1E-07	5.1E-07	1.8E-08	2.2E-08		1.3E-06	4.6E-04	3.3E-04	1.2E-05	2.9E-05	8.2E-04
Chrysene	552	9.9E-08	7.1E-08	2.6E-09	3.1E-09		1.8E-07	6.3E-04	4.6E-04	1.6E-05	4.1E-05	1.1E-03
Benzo(b)fluoranthene	198	3.6E-07	2.6E-07	9.2E-09	1.1E-08		6.3E-07	2.3E-04	1.6E-04	5.9E-06	1.5E-05	4.1E-04
Benzo(k)fluoranthene	37	6.6E-09	4.8E-09	1.7E-10	2.0E-10		1.2E-08	4.3E-05	3.1E-05	1.1E-06	2.8E-06	7.7E-05
Benzo(a)pyrene	175	3.1E-06	2.3E-06	8.1E-08	9.7E-08		5.6E-06	2.0E-04	1.4E-04	5.2E-06	1.3E-05	3.6E-04
Indeno(1,2,3-cd)pyrene	25	4.5E-08	3.2E-08	1.2E-09	1.4E-09		8.0E-08	2.9E-05	2.1E-05	7.4E-07	1.9E-06	5.2E-05
Dibenzo(a,h)anthracene	4	7.2E-08	5.2E-08	1.9E-09	2.2E-09		1.3E-07	4.6E-06	3.3E-06	1.2E-07	3.0E-07	8.3E-06
Benzo(g,h,i)perylene	26	#REF!	#REF!	#REF!			#REF!	3.8E-05	1.1E-04	1.0E-06	1.9E-06	1.5E-04
Arsenic	13	1.7E-07	5.2E-08	4.4E-09	1.5E-08		2.4E-07	5.3E-02	1.6E-02	1.4E-03	1.9E-01	2.6E-01
Lead	397	#REF!	#REF!	#REF!			#REF!	3.3E-01	3.9E-02	8.4E-03	1.5E-02	3.9E-01

Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0808

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c-derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh-GI} = LADD_{inh-GI} * CSF_{oral}$$

$$LADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{c-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	(mg/kg-day) ⁻¹
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
RAF _{c-ing}	OHM-specific	dimensionless
RAF _{c-derm}	OHM-specific	dimensionless
RAF _{c-inh}	OHM-specific	dimensionless
EF	0.714	event/day
ED _{ing & derm}	1	day/event
ED _{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/μg
C3	1440	min/days
C4	1.0E-03	m ³ /L
BW	58.0	kg
AP _(lifetime)	25,550	days
VR _{work}	60	L/min
AF	0.29	mg/cm ²
SA	3473	cm ² /day
RCAF _{inh-gi}	1.5	dimensionless
RCAF _{inh}	0.5	dimensionless
PM ₁₀	60	μg/m ³

Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0808

Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral-subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral-subchronic}}$$

$$ADD_{derm} = \frac{EPC * SA * AF * RAF_{nc-derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$HQ_{inh-GI} = \frac{ADD_{inh-GI}}{RfD_{oral-subchronic}}$$

$$ADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{nc-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation-subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
RAF _{nc-ing}	OHM-specific	dimensionless
RAF _{nc-derm}	OHM-specific	dimensionless
RAF _{nc-inh}	OHM-specific	dimensionless
EF	0.714	event/day
EF _{cyanide}	1	event/day
ED _{ing & derm}	1	day/event
ED _{inh}	0.333	day/event
EP	182	days
EP _{cyanide}	1.00	day
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/μg
C3	1440	min/days
C4	1.0E-03	m ³ /L
BW	58.0	kg
AP _{noncancer}	182	days
AP _{cyanide}	1	day
VR _{work}	60	L/min
AF	0.29	mg/cm ²
SA	3473	cm ² /day
RCAF _{inh-gi}	1.5	dimensionless
RCAF _{inh}	0.5	dimensionless
PM10	60	μg/m ³

Cyanide can cause a significant health risk from a one-time exposure to concentrations that are often found in the environment. As such, risk is calculated for a single exposure. Thus, for cyanide, the exposure frequency (EF) is 1 event/day, while both the exposure period (EP) and averaging period (AP) are 1 day.

Construction Worker - Soil: Table CW-4

Definitions and Exposure Factors

Vlookup Version v0808

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	(mg/kg-day) ⁻¹	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	µg/L	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF _c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF _{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
EF _{cyanide} - Exposure Frequency for Cyanide Exposures	1.00	event/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
ED _{ing,derm} - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED _{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
EP _{cyanide} - Exposure period for cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
AP _(lifetime) - Averaging Period for lifetime	25,550	days	Represents 70 years
AP _(noncancer) - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AP _{cyanide} - Averaging period for assessing cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
AF - Adherence Factor	0.29	mg/cm ²	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR _{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm ² /day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
RCAF _{inh-gi} - Relative Concentration Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
RCAF _{inh} - Relative Concentration Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM ₁₀	60	µg/m ³	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

Vlookup Version v0808

Oil or Hazardous Material	Oral CSF (mg/kg-day) ⁻¹	RAF _{c-ing}	RAF _{c-derm}	RAF _{c-inh}	Inhalation CSF (mg/kg-day) ⁻¹	Subchronic Oral RfD mg/kg-day	Subchronic RAF _{nc-ing}	Subchronic RAF _{nc-derm}	Subchronic RAF _{nc-inh}	Subchronic Inhalation RfD
Aliphatics C19 to C36	#REF!	#REF!	#REF!	#REF!		6.0E+00	1	0.1		
Aromatics C11 to C22	#REF!	#REF!	#REF!	#REF!		3.0E-01	0.36	0.1	1	1.4E-01
Naphthalene	#REF!	#REF!	#REF!	#REF!		2.0E-01	0.36	0.1	1	8.6E-04
Methylnaphthalene, 2-	#REF!	#REF!	#REF!	#REF!		4.0E-03	0.36	0.1	1	1.4E-01
Acenaphthene	#REF!	#REF!	#REF!	#REF!		6.0E-01	0.36	0.1	1	1.4E-01
Fluorene	#REF!	#REF!	#REF!	#REF!		4.0E-01	0.36	0.1	1	1.4E-01
Phenanthrene	#REF!	#REF!	#REF!	#REF!		3.0E-01	0.36	0.1	1	1.4E-01
Anthracene	#REF!	#REF!	#REF!	#REF!		3.0E+00	0.36	0.1	1	1.4E-01
Fluoranthene	#REF!	#REF!	#REF!	#REF!		4.0E-01	0.36	0.1	1	1.4E-01
Pyrene	#REF!	#REF!	#REF!	#REF!		3.0E-01	0.36	0.1	1	1.4E-01
Benzo(a)anthracene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Chrysene	7.3E-02	0.28	0.02	1	7.3E-02	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(b)fluoranthene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(k)fluoranthene	7.3E-02	0.28	0.02	1	7.3E-02	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(a)pyrene	7.3E+00	0.28	0.02	1	7.3E+00	3.0E-01	0.28	0.02	1	1.4E-01
Indeno(1,2,3-cd)pyrene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Dibenzo(a,h)anthracene	7.3E+00	0.28	0.02	1	7.3E+00	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(g,h,i)perylene	#REF!	#REF!	#REF!	#REF!		3.0E-01	0.36	0.1	1	1.4E-01
Arsenic	1.5E+00	1	0.03	1	1.5E+01	3.0E-04	1	0.03	1	7.1E-07
Lead	#REF!	#REF!	#REF!	#REF!		7.5E-04	0.5	0.006	1	2.9E-04

Table 2-1
Shallow Surface Soil Data

Sample ID	HA-1-043008	HA-2-043008	HA-3-043008	HA-4-043008	HA-5-043008	HA-6-043008	HA-7-043008	HA-8-043008	HA-9-043008	HA-10-043008	HA043008 (dup HA-10)	HA-11-043008	HA-12-043008	HA-13-043008	HA-14-043008
Sample depth (in)	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4
Sample date	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008	4/30/2008
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Extractable Petroleum Hydrocarbons (EPH)															
C9-C18 Aliphatics															
C19-C36 Aliphatics															
C11-C22 Aromatics	56.7	65.2	66.6	61.3	60.3	57.9	55.1	51.1	72.9	50	51.4	ND	53.1	43.1	46.9
Polycyclic Aromatic Hydrocarbons															
Fluorene											0.2				
Phenanthrene	2.3	1.7	1.4	1.5	1.3	1.4	0.9	0.7	2.1	0.4	1.6	0.2	1.2	0.5	0.3
Anthracene	0.7	0.6	0.5	0.4	0.4	0.5	0.3	0.3	0.7		0.7		0.4	0.2	
Fluoranthene	4.4	3.8	3.9	3.4	2.5	2.4	1.8	1.5	3.0	0.9	1.9	0.4	2.7	1.4	0.9
Pyrene	3.8	3.5	3.4	3.2	2.2	2.2	1.6	1.4	2.5	0.8	1.6	0.3	2.6	1.2	0.8
Benzo(a)anthracene	1.7	1.8	2.0	1.7	1.1	1.2	0.8	0.7	1.3	0.3	0.7	0.2	1.4	0.5	0.4
Chrysene	1.9	1.9	2.2	2.0	1.2	1.2	1.0	0.8	1.3	0.5	0.8	0.2	1.4	0.7	0.5
Benzo(b)fluoranthene	1.5	2.8	2.6	2.4	0.8	0.9	0.7	0.5	1.0	0.2	0.4		1.1	0.9	0.3
Benzo(k)fluoranthene	1.8	0.9	1.8	1.6	1.1	1.2	0.9	0.6	1.0	0.4	0.6	0.2	1.3	0.3	0.5
Benzo(a)pyrene	1.8	2.0	2.2	2.0	1.1	1.3	0.9	0.7	1.2	0.4	0.6	0.2	1.4	0.6	0.4
Indeno(1,2,3-cd)pyrene	1.1	1.2	1.4	1.3	0.7	0.7	0.6	0.4	0.6	0.2	0.3		0.8	0.4	0.3
Dibenzo(a,h)anthracene	ND	0.2	0.2	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND
Benzo(g,h,i)perylene	1.2	1.4	1.7	1.6	0.7	0.9	0.6	0.4	0.6	0.2	0.3		1.0	0.4	0.3
Inorganics															
Arsenic	13.1	6.4	5.7	6.8	7.3	6.9	6.4	9.9	7.4	5.1	4.6	2.8	9.0	10.2	10.7
Lead	73.6	148	113	104	240	189	157	229	195	138	112	11	142	68.6	109
Cyanide	ND	NT	NT	NT	NT	ND	NT	ND	NT	NT	NT	ND	NT	NT	ND

NT not tested, ND not detected

Table 2-2
Summary Statistics for Shallow Surface Soil

	Frequency of Detection*	Minimum	Maximum	Arithmetic Mean	Background Concentrations Natural Soils*	Background Concentrations Soils With Coal Ash*
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Extractable Petroleum Hydrocarbons						
C9-C18 Aliphatics	0/14					
C19-C36 Aliphatics	0/14					
C11-C22 Aromatics	13/14	<27	73	54		
Polycyclic Aromatic Hydrocarbons						
Fluorene	1/14	<0.2	0.2	NC	1	2
Phenanthrene	14/14	0.2	2.3	1.2	3	20
Anthracene	11/14	<0.2	0.7	0.4	1	4
Fluoranthene	14/14	0.4	4.4	2.4	4	10
Pyrene	14/14	0.3	3.8	2.1	4	20
Benzo(a)anthracene	14/14	0.2	2.0	1.1	2	9
Chrysene	14/14	0.2	2.2	1.2	2	7
Benzo(b)fluoranthene	13/14	<0.2	2.8	1.1	2	8
Benzo(k)fluoranthene	14/14	0.2	1.8	1.0	1	4
Benzo(a)pyrene	14/14	0.2	2.2	1.2	2	7
Indeno(1,2,3-cd)pyrene	13/14	<0.2	1.4	0.7	1	3
Dibenzo(a,h)anthracene	2/14	<0.2	0.2	NC	0.5	1
Benzo(g,h,i)perylene	13/14	<0.2	1.7	0.8	1	3
Inorganics						
Arsenic	14/14	2.8	13.1	7.7	20	20
Lead	14/14	11	240	136	100	600
Cyanide	0/5	-	-	-	-	

*Duplicate of HA-10 was averaged with HA-10 and evaluated as single sample

**Reference: <http://www.mass.gov/dep/cleanup/laws/backtu.pdf>

NC not calculated (due to low frequency of detection)

Table 2-3
Deeper Surface Soil (1-3 ft) Data

Sample ID	B-01-02	B-02-02	B-03-02	B-05-02
Sample depth (in)	12-36	12-36	12-36	12-36
Sample date	5/31/2007	5/31/2007	5/31/2007	5/31/2007
Location	grassy area	west of playground	grassy area	SW of playground
Units	mg/kg	mg/kg	mg/kg	mg/kg
Extractable Petroleum Hydrocarbons (EPH)				
C9-C18 Aliphatics				
C19-C36 Aliphatics		800	42.6	252
C11-C22 Aromatics	68	913	161	571
Polycyclic Aromatic Hydrocarbons				
Naphthalene		1.8	0.343	
Acenaphthylene			0.201	
Acenaphthene		0.966	1.39	2.16
Fluorene		1.09	1.85	3.52
Phenanthrene	0.878	15.6	15.1	36
Anthracene	0.398	4.18	3.52	12.6
Fluoranthene	1.96	18.4	15.6	43
Pyrene	1.84	19.9	13.5	36.4
Benzo(a)anthracene	0.444	7.3	6.7	16.4
Chrysene	1.19	10.9	7.04	20.2
Benzo(b)fluoranthene	0.38	6.13	3.79	13.1
Benzo(k)fluoranthene	0.498	6.38	5.8	14.7
Benzo(a)pyrene	0.68	8.64	5.76	17.6
Indeno(1,2,3-cd)pyrene	0.224	4.26	2.52	10.2
Dibenzo(a,h)anthracene				
Benzo(g,h,i)perylene	0.282	5.85	3.29	11.4
Inorganics				
Arsenic	25.7	31.4	NT	NT
Lead	933	131	NT	NT
Cyanide	NT	NT	NT	NT
Volatile Petroleum Hydrocarbons (VPH)				
C5-C8 Aliphatics		1.51	0.983	
C9-12 Aliphatics				
C9-C10 Aromatics	0.509	0.332	0.427	
VPH Target Analytes				
Benzene		0.188		
Toluene		0.143		
Xylenes		0.174		
Napthalene	0.097	1.44	0.078	

NT not tested, ND not detected

Table 2-4
Summary Statistics for Deeper Surface Soil (1-3 ft)

	Frequency of detection	Minimum Concentration*	Maximum Concentration	Arithmetic Mean	Background Concentration Natural Soil*	Background Concentration Soil With Coal Ash**
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Extractable Petroleum Hydrocarbons (EPH)						
C9-C18 Aliphatics	0/4	<37.3	-	-		
C19-C36 Aliphatics	3/4	<41.5	800	279		
C11-C22 Aromatics	4/4	68	913	428		
Polycyclic Aromatic Hydrocarbons						
Naphthalene	2/4	<0.2	1.8	0.6	0.5	1
Acenaphthylene	1/4	<0.2	0.2	NC	0.5	1
Acenaphthene	3/4	<0.2	2.2	1	0.5	2
Fluorene	3/4	<0.2	3.5	2	1	2
Phenanthrene	4/4	0.9	36.0	17	3	20
Anthracene	4/4	0.4	12.6	5	1	4
Fluoranthene	4/4	2.0	43.0	20	4	10
Pyrene	4/4	1.8	36.4	18	4	20
Benzo(a)anthracene	4/4	0.4	16.4	8	2	9
Chrysene	4/4	1.2	20.2	10	2	7
Benzo(b)fluoranthene	4/4	0.4	13.1	6	2	8
Benzo(k)fluoranthene	4/4	0.5	14.7	7	1	4
Benzo(a)pyrene	4/4	0.7	17.6	8	2	7
Indeno(1,2,3-cd)pyrene	4/4	0.2	10.2	4	1	3
Dibenzo(a,h)anthracene	0/4	<0.2	-	-	0.5	1
Benzo(g,h,i)perylene	4/4	0.3	11.4	5	1	3
Inorganics						
Arsenic	2/2	26	31	29	20	20
Lead	2/2	131	933	532	100	600
Cyanide	NT	-	-	-		
Volatile Petroleum Hydrocarbons (VPH)						
C5-C8 Aliphatics	2/3	<1	1.5	1.0		
C9-12 Aliphatics	0/3	<0.3	-	-		
C9-C10 Aromatics	3/3	0.3	0.5	0.4		
VPH Target Analytes						
Benzene	1/3	<0.06	0.19	NC		
Toluene	1/3	<0.06	0.14	NC		
Xylenes	1/3	<0.06	0.17	NC		
Napthalene	3/3	0.08	1.4	0.5	0.5	1

*For analytes not detected in all samples, the minimum concentration is the detection limit

**Reference: <http://www.mass.gov/dep/cleanup/laws/backtu.pdf>

NC not calculated (due to low frequency of detection)

BOLD indicates exceedance of background with coal ash

Table 2-5
Subsurface Soil Data

Sample ID	CONF 1	CONF 2	CONF 3	CONF 5	CONF 6	CONF 7	CONF 8	CONF 9	CONF 10	FD100908/ dupCONF 10	B-01-7	B-02-7	B-03-7	B-04-7	B-05-7	B-06-7	B-07-7	B-08-7	B-09-7	B-10-7	B-11-7
Sample depth (ft)	4	4	4	4	4	4	4	4	4	4	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8
Sample date	10/9/2008	10/9/2008	10/9/2008	10/9/2008	10/9/2008	10/9/2008	10/9/2008	10/9/2008	10/9/2008	10/9/2008	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	39233	39233
units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Extractable Petroleum Hydrocarbons																					
C9-C18 Aliphatics																	832				
C19-C36 Aliphatics								39	52	46							2870			2600	
C11-C22 Aromatics	47	54	49	ND	52	67	82	146	192	423	72	81	80	ND	62	105	2270	83	259	28500	80
Polycyclic Aromatic Hydrocarbons																					
Naphthalene					0.3		0.1		0.7	3.7					0.2			ND	1.8	2900	
2-Methylnaphthalene									0.5	2.0									2.2	1180	
Acenaphthylene																			0.3		
Acenaphthene					0.5	0.2	0.2		1.3	5.5					0.3				3.3	699	
Fluorene					0.7	0.2	0.2		1.4	5.5					0.2				5.1	1270	
Phenanthrene	0.9	2.7	2.0		7.3	2.9	2.7	1.3	13.2	48.7	1.6	0.7	0.6		1.7	0.3	10700		37.6	4800	0.7
Anthracene	0.4	0.7	0.5		2.1	0.8	0.6	0.3	3.8	12.0	0.5	0.3	0.3		0.6		2910		13.2	1940	0.3
Fluoranthene	2.5	4.7	2.7	0.2	8.6	4.5	3.7	2.0	13.3	40.9	2.8	1.2	1.1	0.3	2.1	0.8	9490		35.8	3230	2.0
Pyrene	2.3	4.2	2.2		7.2	3.9	3.3	1.6	11.4	35.4	2.6	1.0	1.0	0.3	1.9	0.8	10100		29.2	2580	1.9
Benzo (a) anthracene	1.4	2.9	1.2		4.4	2.4	1.6	0.7	6.4	18.1	1.1	0.3	0.4		0.9	0.5	6720		15.5	1160	1.0
Chrysene	1.4	2.7	1.2		3.7	2.1	1.8	1.1	5.2	14.9	1.7	0.6	0.6		1.0	0.6	9900		14.6	1090	1.2
Benzo (b) fluoranthene	1.8	2.1	1.8		4.2	2.4	2.8	1.1	4.6	20.8	0.7	0.3	0.3		0.6	0.4	3220		9.4	696	0.7
Benzo (k) fluoranthene	0.7	1.3	0.6		2.1	1.2	1.1	1.0	3.8	13.1	0.9	0.2	0.3		0.7	0.5			10.0	709	1.0
Benzo (a) pyrene	1.2	2.0	0.9		3.1	1.7	1.8	0.8	5.8	17.6	1.2	0.4	0.5		0.8	0.5	2490		12.1	962	1.2
Indeno (1,2,3-cd) pyrene	0.6	0.9	0.5		1.7	1.0	1.2	0.8	3.5	10.7	0.5				0.4	0.3			6.0	478	0.5
Dibenzo (a,h) anthracene							0.2		0.8	2.4						0.2			0.7	80	
Benzo (g,h,i) perylene	0.5	0.6	0.5		1.3	0.9	1.2	0.8	3.3	10.1	0.7				0.4				5.9	494	0.6
Inorganics																					
Arsenic	NT	6.3	NT	NT	NT	NT	NT	19	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Lead	NT	480	NT	NT	NT	NT	NT	313	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

NT not tested, ND not detected

Table 2-6
Summary Statistics for Subsurface Soil

	Frequency of Detection**	Minimum	Maximum	Arithmetic Mean**	Background Concentrations Natural Soils*	Concentrations Soils With Coal Ash*
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Extractable Petroleum Hydrocarbons						
C9-C18 Aliphatics	1/20	-	832	NC		
C19-C36 Aliphatics	4/20	<30	2870	290		
C11-C22 Aromatics	18/20	<30	28500	1621		
Polycyclic Aromatic Hydrocarbons						
Naphthalene	6/20	<0.2	2900	145	0.5	1
2-Methylnaphthalene	3/20	<0.2	1180	59	0.5	1
Acenaphthylene	1/20	<0.2	0.3	NC	0.5	1
Acenaphthene	7/20	<0.2	699	35	0.5	2
Fluorene	7/20	<0.2	1270	64	1	2
Phenanthrene	17/20	<0.2	10700	780	3	20
Anthracene	16/20	<0.2	2910	244	1	4
Fluoranthene	19/20	<0.2	9490	641	4	10
Pyrene	18/20	<0.2	10100	638	4	20
Benzo (a) anthracene	17/20	<0.2	6720	396	2	9
Chrysene	17/20	<0.2	9900	552	2	7
Benzo (b) fluoranthene	17/20	<0.2	3220	198	2	8
Benzo (k) fluoranthene	16/20	<0.2	709	37	1	4
Benzo (a) pyrene	17/20	<0.2	2490	175	2	7
Indeno (1,2,3-cd) pyrene	14/20	<0.2	478	25	1	3
Dibenzo (a,h) anthracene	3/20	<0.2	80	4	0.5	1
Benzo (g,h,i) perylene	13/20	<0.2	494	26	1	3
Arsenic	2/2	6	19	13	20	20
Lead	2/2	313	480	397	100	600

NC not calculated (due to low frequency of detection)

*Reference: <http://www.mass.gov/dep/cleanup/laws/backtu.pdf>

** This is evaluated using the average of the duplicates of CONF 10

BOLD indicates exceedance of background with coal ash

Table 6-1
Construction Worker Exposure and Risk

Construction Worker - Soil: Table CW-1
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 08-08
Vlookup Version v0808

ELCR (all chemicals) = 8.E-06
HI (all chemicals) = 0.7

Oil or Hazardous	EPC	ELCR	ELCR	ELCR	ELCR		Subchronic				
Material (OHM)	(mg/kg)	ingestion	dermal	inhalation GI	inhalation pulmonary	ELCRtotal	HQing	HQderm	HQinh-GI	HQinh	HQtotal
Aliphatics C19 to C36	290	0	0	0	0	0	6.0E-05	6.0E-05	1.5E-06	0.0E+00	1.2E-04
Aromatics C11 to C22	1621	0	0	0	0	0	2.4E-03	6.7E-03	6.2E-05	1.2E-04	9.3E-03
Naphthalene	145	0	0	0	0	0	3.2E-04	9.0E-04	8.3E-06	1.8E-03	3.0E-03
Methylnaphthalene, 2-	59	0	0	0	0	0	6.5E-03	1.8E-02	1.7E-04	4.4E-06	2.5E-02
Acenaphthene	35	0	0	0	0	0	2.6E-05	7.2E-05	6.7E-07	2.6E-06	1.0E-04
Fluorene	64	0	0	0	0	0	7.1E-05	2.0E-04	1.8E-06	4.8E-06	2.8E-04
Phenanthrene	780	0	0	0	0	0	1.2E-03	3.2E-03	3.0E-05	5.8E-05	4.5E-03
Anthracene	244	0	0	0	0	0	3.6E-05	1.0E-04	9.3E-07	1.8E-05	1.6E-04
Fluoranthene	641	0	0	0	0	0	7.1E-04	2.0E-03	1.8E-05	4.8E-05	2.8E-03
Pyrene	638	0	0	0	0	0	9.4E-04	2.6E-03	2.4E-05	4.8E-05	3.7E-03
Benzo(a)anthracene	396	7.1E-07	5.1E-07	1.8E-08	2.2E-08	1.3E-06	4.6E-04	3.3E-04	1.2E-05	2.9E-05	8.2E-04
Chrysene	552	9.9E-08	7.1E-08	2.6E-09	3.1E-09	1.8E-07	6.3E-04	4.6E-04	1.6E-05	4.1E-05	1.1E-03
Benzo(b)fluoranthene	198	3.6E-07	2.6E-07	9.2E-09	1.1E-08	6.3E-07	2.3E-04	1.6E-04	5.9E-06	1.5E-05	4.1E-04
Benzo(k)fluoranthene	37	6.6E-09	4.8E-09	1.7E-10	2.0E-10	1.2E-08	4.3E-05	3.1E-05	1.1E-06	2.8E-06	7.7E-05
Benzo(a)pyrene	175	3.1E-06	2.3E-06	8.1E-08	9.7E-08	5.6E-06	2.0E-04	1.4E-04	5.2E-06	1.3E-05	3.6E-04
Indeno(1,2,3-cd)pyrene	25	4.5E-08	3.2E-08	1.2E-09	1.4E-09	8.0E-08	2.9E-05	2.1E-05	7.4E-07	1.9E-06	5.2E-05
Dibenzo(a,h)anthracene	4	7.2E-08	5.2E-08	1.9E-09	2.2E-09	1.3E-07	4.6E-06	3.3E-06	1.2E-07	3.0E-07	8.3E-06
Benzo(g,h,i)perylene	26	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.8E-05	1.1E-04	1.0E-06	1.9E-06	1.5E-04
Arsenic	13	1.7E-07	5.2E-08	4.4E-09	1.5E-08	2.4E-07	5.3E-02	1.6E-02	1.4E-03	1.9E-01	2.6E-01
Lead	397	0	0	0	0	0	3.3E-01	3.9E-02	8.4E-03	1.5E-02	3.9E-01

Table 8-1

Comparison of Mean Maximum Detected Concentrations in Soil with Upper Concentration Limits (UCLs)

		Deep Surface Soil		Subsurface Soil	
	UCL	Maximum Concentration	Arithmetic Mean	Maximum	Arithmetic Mean
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Extractable Petroleum Hydrocarbons					
C9-C18 Aliphatics	20,000	-	-	832	NC
C19-C36 Aliphatics	20,000	800	279	2870	290
C11-C22 Aromatics	10,000	913	428	28500	1621
Polycyclic Aromatic Hydrocarbons					
Naphthalene	10,000	1.8	0.6	2900	145
2-Methylnaphthalene	5,000	-	-	1180	59
Acenaphthylene	10,000	0.2	NC	0.3	NC
Acenaphthene	10,000	2.2	1	699	35
Fluorene	10,000	3.5	2	1270	64
Phenanthrene	10,000	36.0	17	10700	780
Anthracene	10,000	12.6	5	2910	244
Fluoranthene	10,000	43.0	20	9490	641
Pyrene	10,000	36.4	18	10100	638
Benzo (a) anthracene	3,000	16.4	8	6720	396
Chrysene	10,000	20.2	10	9900	552
Benzo (b) fluoranthene	3,000	13.1	6	3220	198
Benzo (k) fluoranthene	10,000	14.7	7	709	37
Benzo (a) pyrene	300	17.6	8	2490	175
Indeno (1,2,3-cd) pyrene	3,000	10.2	4	478	25
Dibenzo (a,h) anthracene	300	-	-	80	4
Benzo (g,h,i) perylene	10,000	11.4	5	494	26
Inorganics					
Arsenic	200	31	29	19	13
Lead	3,000	933	532	480	397

APPENDIX G

RISK CHARACTERIZATION TABLES

Method 3 Risk Assessment for Chemicals in Soil - Construction Worker Shortform 2008 (sf08cw)

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EPCs	Table CW-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Associated risks are shown to the right.
C Eq	Table CW-2: Equations to calculate cancer risks.
NC Eq	Table CW-3: Equations to calculate noncancer risks.
Exp	Table CW-4: Definitions and exposure factors.
Chem	Table CW-5: Chemical-specific data.

Spreadsheets designed by Andrew Friedmann, MassDEP

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Construction Worker - Soil: Table CW-1
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 08-08

Vlookup Version v0808

****Do not insert or delete any rows****

Click on empty cell below and select OHM using arrow.

ELCR (all chemicals) = 3E-07

HI (all chemicals) = 5E-01

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	ELCR _{total}	Subchronic				HQ _{total}
							HQ _{ing}	HQ _{derm}	HQ _{inh-GI}	HQ _{inh}	
Aliphatics C9 to C18	2.9E+01						3.6E-05	1.8E-04	9.2E-07	1.8E-06	2.2E-04
Aliphatics C19 to C36	5.4E+01						1.1E-05	1.1E-05	2.9E-07		2.2E-05
Aromatics C11 to C22	7.1E+01						1.0E-04	2.9E-04	2.7E-06	5.3E-06	4.1E-04
Acenaphthene	4.7E-01						3.4E-07	9.6E-07	8.9E-09	3.5E-08	1.3E-06
Acenaphthylene	2.1E-01						3.2E-07	8.8E-07	8.2E-09	1.6E-08	1.2E-06
Benzo(a)anthracene	2.8E+00	4.9E-09	3.5E-09	1.3E-10	1.5E-10	8.8E-09	3.2E-06	2.3E-06	8.2E-08	2.0E-07	5.7E-06
Benzo(a)pyrene	2.8E+00	5.0E-08	3.6E-08	1.3E-09	1.5E-09	8.9E-08	3.2E-06	2.3E-06	8.3E-08	2.1E-07	5.8E-06
Benzo(b)fluoranthene	2.1E+00	3.8E-09	2.8E-09	9.9461E-11	1.184E-10	6.8E-09	2.5E-06	1.8E-06	6.4E-08	1.6E-07	4.5E-06
Benzo(g,h,i)perylene	1.7E+00						2.5E-06	7.0E-06	6.5E-08	1.3E-07	9.7E-06
Benzo(k)fluoranthene	2.3E+00	4.2E-10	3.0E-10	1.1E-11	1.3E-11	7.4E-10	2.7E-06	1.9E-06	6.9E-08	1.7E-07	4.8E-06
Chrysene	3.1E+00	5.5E-10	3.9E-10	1.4E-11	1.7E-11	9.7E-10	3.5E-06	2.5E-06	9.1E-08	2.3E-07	6.4E-06
Dibenzo(a,h)anthracene	2.7E-01	4.8E-09	3.5E-09	1.3E-10	1.5E-10	8.6E-09	3.1E-07	2.2E-07	8.0E-09	2.0E-08	5.6E-07
Fluoranthene	6.7E+00						7.4E-06	2.1E-05	1.9E-07	5.0E-07	2.9E-05
Fluorene	6.6E-01						7.3E-07	2.0E-06	1.9E-08	4.9E-08	2.8E-06
Indeno(1,2,3-cd)pyrene	1.5E+00	2.6E-09	1.9E-09	6.8E-11	8.1E-11	4.7E-09	1.7E-06	1.2E-06	4.4E-08	1.1E-07	3.1E-06
Methylnaphthalene, 2-	3.0E-01						3.3E-05	9.3E-05	8.6E-07	2.2E-08	1.3E-04
Naphthalene	3.6E-01						8.0E-07	2.2E-06	2.1E-08	4.5E-06	7.5E-06
Phenanthrene	5.6E+00						8.2E-06	2.3E-05	2.1E-07	4.2E-07	3.2E-05
Pyrene	5.9E+00						8.7E-06	2.4E-05	2.3E-07	4.4E-07	3.4E-05
Arsenic	1.1E+01	1.4E-07	4.3E-08	3.6E-09	1.2E-08	2.0E-07	4.4E-02	1.3E-02	1.1E-03	1.6E-01	2.2E-01
Lead	2.8E+02						2.3E-01	2.8E-02	6.0E-03	1.1E-02	2.8E-01

Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0808

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c-derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh-GI} = LADD_{inh-GI} * CSF_{oral}$$

$$LADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{c-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	(mg/kg-day) ⁻¹
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
RAF _{c-ing}	OHM-specific	dimensionless
RAF _{c-derm}	OHM-specific	dimensionless
RAF _{c-inh}	OHM-specific	dimensionless
EF	0.714	event/day
ED _{ing & derm}	1	day/event
ED _{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/μg
C3	1440	min/days
C4	1.0E-03	m ³ /L
BW	58.0	kg
AP _(lifetime)	25,550	days
VR _{work}	60	L/min
AF	0.29	mg/cm ²
SA	3473	cm ² /day
RCAF _{inh-gi}	1.5	dimensionless
RCAF _{inh}	0.5	dimensionless
PM ₁₀	60	μg/m ³

Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0808

Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral-subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral-subchronic}}$$

$$ADD_{derm} = \frac{EPC * SA * AF * RAF_{nc-derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$HQ_{inh-GI} = \frac{ADD_{inh-GI}}{RfD_{oral-subchronic}}$$

$$ADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{nc-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation-subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
RAF _{nc-ing}	OHM-specific	dimensionless
RAF _{nc-derm}	OHM-specific	dimensionless
RAF _{nc-inh}	OHM-specific	dimensionless
EF	0.714	event/day
EF _{cyanide}	1	event/day
ED _{ing & derm}	1	day/event
ED _{inh}	0.333	day/event
EP	182	days
EP _{cyanide}	1.00	day
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/μg
C3	1440	min/days
C4	1.0E-03	m ³ /L
BW	58.0	kg
AP _{noncancer}	182	days
AP _{cyanide}	1	day
VR _{work}	60	L/min
AF	0.29	mg/cm ²
SA	3473	cm ² /day
RCAF _{inh-gi}	1.5	dimensionless
RCAF _{inh}	0.5	dimensionless
PM10	60	μg/m ³

Cyanide can cause a significant health risk from a one-time exposure to concentrations that are often found in the environment. As such, risk is calculated for a single exposure. Thus, for cyanide, the exposure frequency (EF) is 1 event/day, while both the exposure period (EP) and averaging period (AP) are 1 day.

Construction Worker - Soil: Table CW-4

Definitions and Exposure Factors

Vlookup Version v0808

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	(mg/kg-day) ⁻¹	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	µg/L	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF _c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF _{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
EF _{cyanide} - Exposure Frequency for Cyanide Exposures	1.00	event/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
ED _{ing,derm} - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED _{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
EP _{cyanide} - Exposure period for cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
AP _(lifetime) - Averaging Period for lifetime	25,550	days	Represents 70 years
AP _(noncancer) - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AP _{cyanide} - Averaging period for assessing cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
AF - Adherence Factor	0.29	mg/cm ²	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR _{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm ² /day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
RCAF _{inh-gi} - Relative Concentration Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
RCAF _{inh} - Relative Concentration Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM ₁₀	60	µg/m ³	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

Vlookup Version v0808

Oil or Hazardous Material	Oral CSF (mg/kg-day) ⁻¹	RAF _{c-ing}	RAF _{c-derm}	RAF _{c-inh}	Inhalation CSF (mg/kg-day) ⁻¹	Subchronic Oral RfD mg/kg-day	Subchronic RAF _{nc-ing}	Subchronic RAF _{nc-derm}	Subchronic RAF _{nc-inh}	Subchronic Inhalation RfD
Aliphatics C9 to C18						1.0E+00	1	0.5	1	1.7E-01
Aliphatics C19 to C36						6.0E+00	1	0.1		
Aromatics C11 to C22						3.0E-01	0.36	0.1	1	1.4E-01
Acenaphthene						6.0E-01	0.36	0.1	1	1.4E-01
Acenaphthylene						3.0E-01	0.36	0.1	1	1.4E-01
Benzo(a)anthracene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(a)pyrene	7.3E+00	0.28	0.02	1	7.3E+00	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(b)fluoranthene	7.300E-01	0.28	0.02	1.00	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(g,h,i)perylene						3.0E-01	0.36	0.1	1	1.4E-01
Benzo(k)fluoranthene	7.3E-02	0.28	0.02	1	7.3E-02	3.0E-01	0.28	0.02	1	1.4E-01
Chrysene	7.3E-02	0.28	0.02	1	7.3E-02	3.0E-01	0.28	0.02	1	1.4E-01
Dibenzo(a,h)anthracene	7.3E+00	0.28	0.02	1	7.3E+00	3.0E-01	0.28	0.02	1	1.4E-01
Fluoranthene						4.0E-01	0.36	0.1	1	1.4E-01
Fluorene						4.0E-01	0.36	0.1	1	1.4E-01
Indeno(1,2,3-cd)pyrene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Methylnaphthalene, 2-						4.0E-03	0.36	0.1	1	1.4E-01
Naphthalene						2.0E-01	0.36	0.1	1	8.6E-04
Phenanthrene						3.0E-01	0.36	0.1	1	1.4E-01
Pyrene						3.0E-01	0.36	0.1	1	1.4E-01
Arsenic	1.5E+00	1	0.03	1	1.5E+01	3.0E-04	1	0.03	1	7.1E-07
Lead						7.5E-04	0.5	0.006	1	2.9E-04

Method 3 Risk Assessment for Resident Exposed to Chemicals in Soil - Shortform 2006 (sf06rs)

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Tab

EPCs Table RS-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Associated risks are shown to the right.

C Eq Table RS-2: Equations to calculate cancer risks.

cNC Eq Table RS-3: Equations to calculate chronic noncancer risks.

scNC Eq Table RS-4: Equations to calculate subchronic noncancer risks.

Exp Table RS-5: Definitions and exposure factors.

Produce Table RS-6: Equations to calculate produce ingestion rate.

Chem Table RS-7: Chemical-specific data.

Spreadsheets designed by Andrew Friedmann, MassDEP

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Resident - Soil: Table RS-1
Exposure Point Concentration (EPC)
Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

ShortForm Version 4-06

Vlookup Version v0808

****Do not insert or delete any rows****

Click on empty cell below and select OHM using arrow.

ELCR (all chemicals) = 2E-04
 Chronic HI (all chemicals) = 2E+01
 Subchronic HI (all chemicals) = 3E+01

Oil or Hazardous Material	EPC (mg/kg)	ELCR _{ingestion}	ELCR _{dermal}	ELCR _{vegetable}	ELCR _{total}	Chronic			HQ _{total}	Subchronic			HQ _{total}
						HQ _{ing}	HQ _{derm}	HQ _{vegetable}		HQ _{ing}	HQ _{derm}	HQ _{vegetable}	
Aliphatics C9 to C18	2.9E+01					7.0E-04	3.0E-03		3.7E-03	1.9E-04	5.6E-04		7.6E-04
Aliphatics C19 to C36	5.4E+01					6.5E-05	5.5E-05		1.2E-04	6.0E-05	3.5E-05		9.5E-05
Aromatics C11 to C22	7.1E+01					2.1E-03	4.9E-03		6.9E-03	5.7E-04	9.2E-04		1.5E-03
Acenaphthene	4.7E-01					6.8E-06	1.6E-05		2.3E-05	1.9E-06	3.0E-06		4.9E-06
Acenaphthylene	2.1E-01					6.2E-06	1.5E-05		2.1E-05	1.7E-06	2.8E-06		4.5E-06
Benzo(a)anthracene	2.8E+00	2.1E-07	1.6E-07		3.7E-07	6.2E-05	3.8E-05		1.0E-04	1.7E-05	7.2E-06		2.4E-05
Benzo(a)pyrene	2.8E+00	2.1E-06	1.6E-06		3.7E-06	6.3E-05	3.8E-05		1.0E-04	1.7E-05	7.2E-06		2.5E-05
Benzo(b)fluoranthene	2.1E+00	1.6E-07	1.2E-07		2.8E-07	4.8E-05	2.9E-05		7.8E-05	1.3E-05	5.6E-06		1.9E-05
Benzo(g,h,i)perylene	1.7E+00					4.9E-05	1.2E-04		1.7E-04	1.4E-05	2.2E-05		3.6E-05
Benzo(k)fluoranthene	2.3E+00	1.8E-08	1.3E-08		3.1E-08	5.3E-05	3.2E-05		8.5E-05	1.5E-05	6.1E-06		2.1E-05
Chrysene	3.1E+00	2.3E-08	1.7E-08		4.1E-08	6.9E-05	4.2E-05		1.1E-04	1.9E-05	8.0E-06		2.7E-05
Dibenzo(a,h)anthracene	2.7E-01	2.1E-07	1.5E-07		3.6E-07	6.1E-06	3.7E-06		9.8E-06	1.7E-06	7.0E-07		2.4E-06
Fluoranthene	6.7E+00					1.5E-04	3.4E-04		4.9E-04	4.0E-05	6.5E-05		1.0E-04
Fluorene	6.6E-01					1.4E-05	3.4E-05		4.8E-05	4.0E-06	6.4E-06		1.0E-05
Indeno(1,2,3-cd)pyrene	1.5E+00	1.1E-07	8.3E-08		2.0E-07	3.3E-05	2.0E-05		5.3E-05	9.2E-06	3.8E-06		1.3E-05
Methylnaphthalene, 2-	3.0E-01					6.5E-05	1.5E-04		2.2E-04	1.8E-04	2.9E-04		4.7E-04
Naphthalene	3.6E-01					1.6E-05	3.7E-05		5.3E-05	4.3E-06	7.0E-06		1.1E-05
Phenanthrene	5.6E+00					1.6E-04	3.8E-04		5.5E-04	4.5E-05	7.3E-05		1.2E-04
Pyrene	5.9E+00					1.7E-04	4.0E-04		5.8E-04	4.7E-05	7.6E-05		1.2E-04
Arsenic	1.1E+01	6.0E-06	1.9E-06	1.7E-04	1.8E-04	8.6E-02	2.2E-02	1.3E+00	1.4E+00	2.4E-01	4.2E-02	1.8E+00	2.1E+00
Lead	2.8E+02					4.6E-01	4.7E-02	2.0E+01	2.1E+01	1.3E+00	8.8E-02	2.9E+01	3.0E+01

Resident - Soil: Table RS-2

Equations to Calculate Cancer Risk for Resident (Age 1-31 years)

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing(1-31)} * CSF$$

$$LADD_{ing(1-31)} = LADD_{ing(1-8)} + LADD_{ing(8-15)} + LADD_{ing(15-31)}$$

$$LADD_{ing(age\ group\ x)} = \frac{[OHM]_{soil} * IR_x * RAF_{c-ing} * EF_{ing} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm(1-31)} = LADD_{derm(1-8)} + LADD_{derm(8-15)} + LADD_{derm(15-31)}$$

$$LADD_{derm(age\ group\ x)} = \frac{[OHM]_{soil} * SA_x * RAF_{c-derm} * SAF_x * EF_{derm} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Homegrown Produce

$$ELCR_{produce} = LADD_{produce(1-31)} * CSF$$

$$LADD_{produce(1-31)} = LADD_{produce(1-8)} + LADD_{produce(8-15)} + LADD_{produce(15-31)}$$

$$LADD_{produce(age\ x)} = \frac{[OHM]_{soil} * PUF * PIR_x * RAF_{produce} * EF_{produce} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Vlookup Version v0808

Parameter	Value	Units
CSF	OHM specific	(mg/kg-day) ⁻¹
LADD	age/OHM specific	mg/kg-day
[OHM] _{soil}	OHM specific	mg/kg
IR ₍₁₋₈₎	100	mg/day
IR ₍₈₋₁₅₎	50	mg/day
IR ₍₁₅₋₃₁₎	50	mg/day
PIR ₍₁₋₈₎	12,099	mg/day
PIR ₍₈₋₁₅₎	17,809	mg/day
PIR ₍₁₅₋₃₁₎	24,420	mg/day
RAF _{c-ing}	OHM specific	dimensionless
RAF _{c-derm}	OHM specific	dimensionless
RAF _{c-produce}	OHM specific	dimensionless
EF _{ing,derm}	0.412	event/day
EF _{produce}	1.00	event/day
ED	1	day/event
EP ₍₁₋₈₎	7	years
EP ₍₈₋₁₅₎	7	years
EP ₍₁₅₋₃₁₎	16	years
C	0.000001	kg/mg
BW ₍₁₋₈₎	17.0	kg
BW ₍₈₋₁₆₎	39.9	kg
BW ₍₁₆₋₃₁₎	58.7	kg
AP _(lifetime)	70	years
SA ₍₁₋₈₎	2431	cm ² / day
SA ₍₈₋₁₅₎	4427	cm ² / day
SA ₍₁₅₋₃₁₎	5653	cm ² / day
SAF ₍₁₋₈₎	0.35	mg/cm ²
SAF ₍₈₋₁₅₎	0.14	mg/cm ²
SAF ₍₁₅₋₃₁₎	0.13	mg/cm ²
PUF	OHM specific	(mg/mg)(mg/mg) ⁻¹

Resident - Soil: Table RS-3
Equations to Calculate Chronic Noncancer Risk for Resident Child (Age 1-8 years)

Vlookup Version v0808

Chronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc-ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc-derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Homegrown Produce

$$HQ_{produce} = \frac{ADD_{produce}}{RfD}$$

$$ADD_{produce} = \frac{[OHM]_{soil} * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
[OHM] _{soil}	OHM specific	mg/kg
IR	100	mg/day
PIR	12,099	mg/day
RAF _{nc-ing}	OHM specific	dimensionless
RAF _{nc-derm}	OHM specific	dimensionless
RAF _{nc-produce}	OHM specific	dimensionless
EF _{ing,derm}	0.412	event/day
EF _{produce}	1.00	event/day
EF _{cyanide}	1.00	event/day
ED	1	day/event
EP	7	years
EP _{cyanide}	1	day
C	0.000001	kg/mg
BW	17.0	kg
AP	7	year
AP _{cyanide}	1	day
SA	2431	cm ² / day
SAF	0.35	mg/cm ²
PUF	OHM specific	(mg/mg)(mg/mg) ⁻¹

Cyanide can cause a significant health risk from one-time exposure to concentrations that are often found in the environment. As such, risk is calculated for a single exposure. Thus, for cyanide, the exposure frequency (EF) is 1 event/day, while both the exposure period (EP) and averaging period (AP) are 1 day.

Resident - Soil: Table RS-4
Equations to Calculate Subchronic Noncancer Risk for Resident Child (Age 1-2 years)

Vlookup Version v0808

Subchronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc-ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc-derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Homegrown Produce

$$HQ_{produce} = \frac{ADD_{produce}}{RfD_{subchronic}}$$

$$ADD_{produce} = \frac{[OHM]_{soil} * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
[OHM] _{soil}	OHM specific	mg/kg
IR	100	mg/day
PIR	10,900	mg/day
RAF _{nc-ing}	OHM specific	dimensionless
RAF _{nc-derm}	OHM specific	dimensionless
RAF _{nc-produce}	OHM specific	dimensionless
EF _{ing,derm}	0.714	event/day
EF _{produce}	1.00	event/day
EF _{cyanide}	1.00	event/day
ED	1	day/event
EP _{cyanide}	1	day
EP	0.577	years
C	0.000001	kg/mg
BW	10.7	kg
AP	0.577	year
AP _{cyanide}	1	day
SA	1670	cm ² / day
SAF	0.35	mg/cm ²
PUF	OHM specific	(mg/mg)(mg/mg) ⁻¹

Cyanide can cause a significant health risk from one-time exposure to concentrations that are often found in the environment. As such, risk is calculated for a single exposure. Thus, for cyanide, the exposure frequency (EF) is 1 event/day, while both the exposure period (EP) and averaging period (AP) are 1 day.

Resident - Soil: Table RS-5
Definitions and Exposure Factors

Vlookup Version v0808

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	(mg/kg-day) ⁻¹	see Table RS-7
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
LADE - Lifetime Average Daily Exposure	chemical specific	µg/m ³	
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table RS-7
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
ADE - Average Daily Exposure	chemical specific	mg/m ³	
EPC - Exposure Point Concentration	chemical specific	mg/kg	
PUF - Plant Uptake Factor	chemical specific	(mg/mg)/(mg/mg)	See Table RS-7; (mg _{OHM} /mg _{plant})/(mg _{OHM} /mg _{soil}) ⁻¹
IR ₍₁₋₂₎ - Soil Ingestion Rate for age group 1-2	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm)
IR ₍₁₋₈₎ - Soil Ingestion Rate for age group 1-8	100	mg/day	Ibid
IR ₍₈₋₁₅₎ - Soil Ingestion Rate for age group 8-15	50	mg/day	Ibid
IR ₍₁₅₋₃₁₎ - Soil Ingestion Rate for age group 15-31	50	mg/day	Ibid
PIR ₍₁₋₂₎ = Produce Ingestion Rate for age group 1-2	10,900	mg/day	see Table RS-6
PIR ₍₁₋₈₎ = Produce Ingestion Rate for age group 1-8	12,099	mg/day	see Table RS-6
PIR ₍₈₋₁₅₎ = Produce Ingestion Rate for age group 8-15	17,809	mg/day	Ibid
PIR ₍₁₅₋₃₁₎ = Produce Ingestion Rate for age group 15-31	24,420	mg/day	Ibid
RAF _c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	
EF _{subchronic} - Exposure Frequency for subchronic ingestion or dermal exposure	0.714	event/day	5 days/week
EF _{chronic} - Exposure Frequency for chronic ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
EF _{cancer} - Exposure Frequency for cancer, ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
EF _{produce} - Exposure Frequency for produce ingestion, cancer and noncancer	1.00	event/day	
EF _{cyanide} - Exposure Frequency for subchronic and chronic non-cancer cyanide	1.00	event/day	
ED - Exposure Duration	1	day/event	
EP ₍₁₋₂₎ - Exposure Period for age group 1-2	0.577	years	30 weeks
EP ₍₁₋₈₎ - Exposure Period for age group 1-8	7	years	
EP ₍₈₋₁₅₎ - Exposure Period for age group 8-15	7	years	
EP ₍₁₅₋₃₁₎ - Exposure Period for age group 15-31	16	years	
EP _{cyanide} - Exposure period for cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
BW ₍₁₋₂₎ - Body Weight for age group 1-2	10.7	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, females.
BW ₍₁₋₈₎ - Body Weight for age group 1-8	17.0	kg	Ibid
BW ₍₈₋₁₅₎ - Body Weight for age group 8-15	39.9	kg	Ibid
BW ₍₁₅₋₃₁₎ - Body Weight for age group 15-31	58.7	kg	Ibid
AP _{subchronic} - Averaging Period for subchronic noncancer	0.577	years	30 weeks
AP _{chronic} - Averaging Period for chronic noncancer	7	years	
AP _{cancer} - Averaging Period for lifetime	70	years	
AP _{cyanide} - Averaging period for assessing cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
SA ₍₁₋₂₎ - Surface Area for age group 1-2	1670	cm ² / day	50th percentile of face (1/3 head), forearms, hands, lower legs, and feet for females
SA ₍₁₋₈₎ - Surface Area for age group 1-8	2431	cm ² / day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Appendix Table B-2.
SA ₍₈₋₁₅₎ - Surface Area for age group 8-15	4427	cm ² / day	Ibid
SA ₍₁₅₋₃₁₎ - Surface Area for age group 15-31	5653	cm ² / day	Ibid
SAF ₍₁₋₂₎ - Surface Adherence Factor for age group 1-2	0.35	mg/cm ²	All SAFs developed for ShortForm according to procedure outlined in MA DEP Technical Update:
SAF ₍₁₋₈₎ - Surface Adherence Factor for age group 1-8	0.35	mg/cm ²	Weighted Skin-Soil Adherence Factors, April 2002
SAF ₍₈₋₁₅₎ - Surface Adherence Factor for age group 8-15	0.14	mg/cm ²	
SAF ₍₁₅₋₃₁₎ - Surface Adherence Factor for age group 15-31	0.13	mg/cm ²	

Resident - Soil: Table RS-6
Homegrown Produce Ingestion Rate

Vlookup Version v0808

Data on mean produce ingestion rates (wet weight, ww) in the Northeast was obtained from the 1994-1996 Continuing Survey of Food Intakes by Individuals (USDA). Data for both genders were used for children under 6, while data for males was used for individuals 6 and older. The mean ingestion rates presented in the survey represent the arithmetic average of all individuals surveyed, regardless of whether or not they had consumed the produce item (e.g., an individual that did not consume the produce item was assigned a rate of 0 g/day). To determine the mean ingestion rate for individuals who ate each produce item, the ingestion rate for all individuals (consumers and nonconsumers) was divided by the percentage of individuals who ate the item (Table RS-6A). These mean ingestion rates for the produce consumers were summed to determine the total produce ingestion rate for each age-group and converted to dry weight assuming the produce items were all 90% water.

To convert mean ingestion rates for the age-groups studied in the survey to age-groups used in risk calculations, each age-group ingestion rate from the survey (i.e., 1 - 2 year olds, 3 - 5 year olds, 6 - 11 year olds, 12 - 19 year olds, and 20 - 39 year olds) was weighted according to the number of years spent in the risk calculation age group (i.e., 1 - 8 year olds, 8 - 15 year olds, and 15 - 31 year olds) (Table RS-6B). It was assumed that 25% of produce ingested was home-grown (Table RS-6C).

Table RS-6A

Age-groups studied	White Potatoes			Dark-green vegetables			Deep-yellow vegetables		
	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers
	g/d (ww)	item.	g/d (ww)	g/d (ww)	item.	g/d (ww)	g/d (ww)	item.	g/d (ww)
1-2	28	40.3	69.5	6	10.1	59.4	5	12.7	39.4
3-5	30	37.1	80.9	5	6.5	76.9	7	12.7	55.1
6-11	47	44.2	106.3	6	9.1	65.9	2	8.5	23.5
12-19	59	40.3	146.4	2	2.3	87.0	11	15.8	69.6
20-39	76	45.1	168.5	25	14.7	170.1	4	5.7	70.2

Age-groups studied	Tomatoes			Lettuce			Green Beans		
	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers
	g/d (ww)	item.	g/d (ww)	g/d (ww)	item.	g/d (ww)	g/d (ww)	item.	g/d (ww)
1-2	10	27.9	35.8	1	6	16.7	7	12.1	57.9
3-5	10	37.1	27.0	4	14	28.6	3	5.7	52.6
6-11	20	42	47.6	8	14.9	53.7	1	2	50.0
12-19	29	45.2	64.2	19	28.7	66.2	2	2.4	83.3
20-39	48	50.9	94.3	18	29.6	60.8	4	3.7	108.1

Table RS-6A (continued)

Age-groups studied	Corn, Green peas, Lima beans			Melons, berries			Totals	Totals
	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers	Ingestion Rate for All	% of individuals that consumed	Ingestion Rate for Consumers	Wet Weight WWI	Dry Weight DWI
	g/d (ww)	item.	g/d (ww)	g/d (ww)	item.	g/d (ww)	g/day	g/day
1-2	12	15	80.0	7	9	77.8	436.4	43.6
3-5	14	21.7	64.5	14	11.6	120.7	506.3	50.6
6-11	9	13.6	66.2	5	5.9	84.7	498.0	49.8
12-19	14	9.9	141.4	17	5	340.0	998.1	99.8
20-39	12	7.3	164.4	6	4.5	133.3	969.7	97.0

Table RS-6B

Age-groups studied	Years spent in age-group for 1-8 year old	Years spent in age-group for 8-15 year old	Years spent in age-group for 15-31 year old
1-2	2		
3-5	3		
6-11	2	4	
12-19		3	4
20-39			12
	7	7	16

Table RS-6C

Produce Intake, dry weight				Adult 15-31 g/day
Child 1-2 years g/day	Child 1-8 years g/day	Child 8-15 years g/day		
All Produce:	43.6	48.4	71.2	
Homegrown:	10.9	12.1	17.8	24.4

Resident - Soil: Table RS-7
Chemical-Specific Data

Vlookup Version v0808

Oil or Hazardous Material	CSF (mg/kg-day) ⁻¹	RAF _{c-ing}	RAF _{c-derm}	RAF _{c-prod}	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic RAF _{nc-ing}	Chronic RAF _{nc-derm}	Subchronic RAF _{nc-ing}	Subchronic RAF _{nc-derm}	RAF _{nc-prod}	PUF
Aliphatics C9 to C18					1.0E-01	1.0E+00	1	0.5	1	0.5		
Aliphatics C19 to C36					2.0E+00	6.0E+00	1	0.1	1	0.1		
Aromatics C11 to C22					3.0E-02	3.0E-01	0.36	0.1	0.36	0.1		
Acenaphthene					6.0E-02	6.0E-01	0.36	0.1	0.36	0.1		
Acenaphthylene					3.0E-02	3.0E-01	0.36	0.1	0.36	0.1		
Benzo(a)anthracene	7.3E-01	0.28	0.02		3.0E-02	3.0E-01	0.28	0.02	0.28	0.02		
Benzo(a)pyrene	7.3E+00	0.28	0.02		3.0E-02	3.0E-01	0.28	0.02	0.28	0.02		
Benzo(b)fluoranthene	7.3E-01	0.28	0.02		3.0E-02	3.0E-01	0.28	0.02	0.28	0.02		
Benzo(g,h,i)perylene					3.0E-02	3.0E-01	0.36	0.1	0.36	0.1		
Benzo(k)fluoranthene	7.3E-02	0.28	0.02		3.0E-02	3.0E-01	0.28	0.02	0.28	0.02		
Chrysene	7.3E-02	0.28	0.02		3.0E-02	3.0E-01	0.28	0.02	0.28	0.02		
Dibenzo(a,h)anthracene	7.3E+00	0.28	0.02		3.0E-02	3.0E-01	0.28	0.02	0.28	0.02		
Fluoranthene					4.0E-02	4.0E-01	0.36	0.1	0.36	0.1		
Fluorene					4.0E-02	4.0E-01	0.36	0.1	0.36	0.1		
Indeno(1,2,3-cd)pyrene	7.3E-01	0.28	0.02		3.0E-02	3.0E-01	0.28	0.02	0.28	0.02		
Methylnaphthalene, 2-					4.0E-03	4.0E-03	0.36	0.1	0.36	0.1		
Naphthalene					2.0E-02	2.0E-01	0.36	0.1	0.36	0.1		
Phenanthrene					3.0E-02	3.0E-01	0.36	0.1	0.36	0.1		
Pyrene					3.0E-02	3.0E-01	0.36	0.1	0.36	0.1		
Arsenic	1.5E+00	1.00	0.03	1.00	3.0E-04	3.0E-04	1	0.03	1	0.03	1	0.05
Lead					7.5E-04	7.5E-04	0.5	0.006	0.5	0.006	0.5	0.15

APPENDIX H

AUL DOCUMENTATION



STATEMENT OF TERMINATION OF
 NOTICE OF ACTIVITY AND USE LIMITATION
 M.G.L. c.21E, §6 and 310 CMR 40.0000

Disposal Site Name: Volpe National Transportation Systems Center, 55 Broadway, Cambridge, MA
 DEP Release Tracking No.(s): 3-26067

I, David Duncan, Director of Administrations, on behalf of the United States of America, Department of Transportation, being the owner of that certain parcels of land located in Cambridge, Middlesex County, Massachusetts, with the buildings and improvements situated thereon, said land being more particularly bounded and described in Exhibit A, attached hereto and made a part hereof ("Property"), do hereby terminate that certain Notice of Activity and Use Limitation dated 29th day of January, 2009, and recorded with the Middlesex County Registry of Deeds in Book 52151, Page 430, said Notice of Activity and Use Limitation and any amendments thereto hereinafter being collectively referred to as "Notice" affecting said Property or portion thereof, so that said Notice may be substituted by the Notice of Activity and Use Limitation given by the undersigned, dated May 13, 2011, and recorded immediately hereafter.

This Statement of Termination of Notice of Activity and Use Limitation to become effective upon its recordation with the appropriate Registry of Deeds.

WITNESS the execution hereof under seal this 12th day of May, 2011.

By: David I. Duncan
 David Duncan
 ✓ Chief, Real Property and Facility Services
 United States of America
 Department of Transportation

COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss

May 12, 2011

On this 12th day of May, 2011, before me, the undersigned notary public, personally appeared David Duncan proved to me through satisfactory evidence of identification, which were US DOT ID, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose as Director of Administrations for the Department of Transportation of the United States of America.

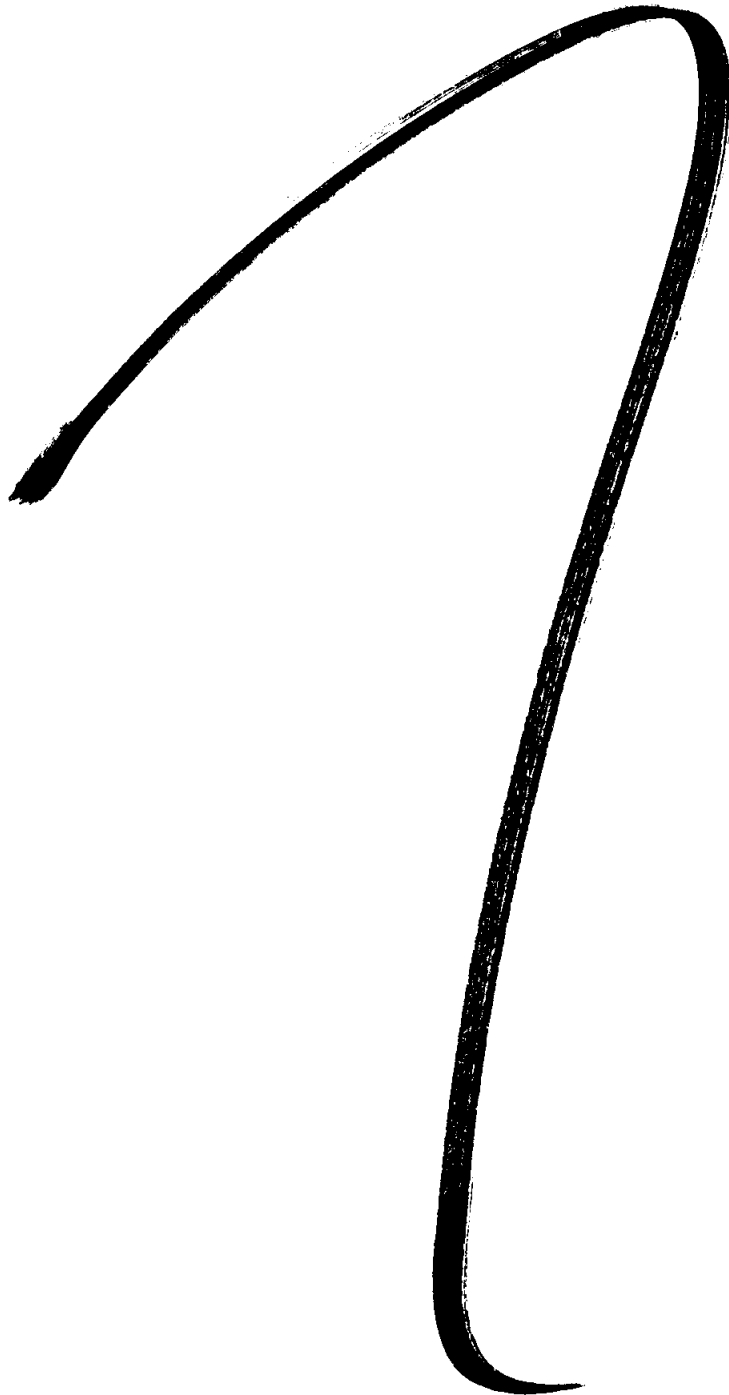
[Signature]
 Notary Public

My commission expires: May 30, 2014

Return to:
 FS Engineers, Inc.
 2 Clock Tower Place, Suite 630
 Maynard, MA 01754

EXHIBIT A

Legal description of parcel of land subject to notice.



JUN 30 4 46 PM '71 66856-195

BK11152 PG461

DEED

KNOW ALL MEN BY THESE PRESENTS THAT CAMBRIDGE REDEVELOPMENT AUTHORITY, a public body politic and corporate, duly established under the Massachusetts Housing Authority Law in the County of Middlesex, Commonwealth of Massachusetts (hereinafter referred to as the Grantor), for and in consideration of the sum of Six Hundred Fifty-Eight Thousand Dollars (\$658,000), the receipt of which sum is hereby acknowledged by the Grantor, does hereby grant to the UNITED STATES OF AMERICA, and its assigns (hereinafter referred to as the Grantee), with QUITCLAIM COVENANTS, the following described land located in the City of Cambridge, County of Middlesex, Commonwealth of Massachusetts:

A certain parcel of land, situated in Cambridge, Middlesex County, Massachusetts, bounded and described as follows:

Beginning at a point on the southerly line of Potter Street, which point is 187.97 feet distant northwesterly from the intersection of the southerly line of Potter Street and the westerly line of Third Street, said point of beginning being also on the division line between land of Badger Manufacturing Corporation and land of Cambridge Redevelopment Authority; thence running by land of Badger Manufacturing Corporation South 29° 34' 08" West, a distance of 169.10 feet and South 61° 26' 13" East, a distance of 167.88 feet, to a point; thence running by other land of the Cambridge Redevelopment Authority South 27° 08' 43" West, a distance of 217.21 feet, to a point of curvature and by a curve to the right having a radius of 20.00 feet, an arc length of 32.24 feet, to a point of tangency, said point of tangency being 32.0 feet distant northerly from and measured at right angles to the northerly line of Broadway; thence running North 60° 30' 18" West, by a line which is 32.00 feet distant northerly from and parallel with the northerly line of Broadway, by the land of the Cambridge Redevelopment Authority, a distance of 374.82 feet, to a point; thence running South 29° 29' 42" West, a distance of 20.00 feet, by other land of the Cambridge Redevelopment Authority to a point which is 20.00 feet distant northerly from and measured at right angles to the northerly line of Broadway; thence running North 60° 30' 18" West, by a line which is 20.00 feet distant northerly from and parallel with the northerly line of Broadway, by other land of the Cambridge Redevelopment Authority, a distance of 235.03 feet, to a point; thence running by other land of the Cambridge Redevelopment Authority North 29° 44' 57" East, a distance of 338.76 feet, South 60° 30' 18" East, a distance of 90.71 feet and North 29° 29' 42" East, a distance of 77.37 feet, to a point in the southerly line of Potter Street; thence running South 60° 31' 14" East, a distance of 361.18 feet along said southerly line of Potter Street, to the point of beginning.

Containing 219,370 square feet, more or less.

BK11152 PG482

Included within the above-described premises conveyed hereby is certain registered land described as follows:

A certain parcel of land situated in the City of Cambridge, County of Middlesex, and Commonwealth of Massachusetts, being more particularly bounded and described as follows:

BEGINNING at a POINT OF BEGINNING which is located by beginning on the westerly line of Third Street at a point of tangency of a corner rounding from Broadway; thence running North $29^{\circ}-37'-59''$ East, a distance of one hundred seventy-seven and 00/100 (177.00) feet, along said westerly line of said Third Street, to a point on the southerly line of Broad Canal, now land of Cambridge Redevelopment Authority; and thence running North $61^{\circ}-14'-45''$ West, a distance of twenty-eight and 94/100 (28.94) feet, along said southerly line of said Broad Canal to said POINT OF BEGINNING;

THENCE running South $27^{\circ}-08'-43''$ West, a distance of one hundred thirty-eight and 89/100 (138.89) feet, through land of said Cambridge Redevelopment Authority, to a point of curvature;

THENCE running by a curve to the right, having a radius of twenty and 00/100 (20.00) feet, an arc length of thirty-two and 24/100 (32.24) feet, through land of Cambridge Redevelopment Authority, to a point of tangency;

THENCE running North $60^{\circ}-30'-18''$ West, a distance of three hundred seventy-four and 92/100 (374.92) feet, through land of Cambridge Redevelopment Authority, to a point;

THENCE running South $29^{\circ}-29'-42''$ West, a distance of twelve and 00/100 (12.00) feet, through land of Cambridge Redevelopment Authority, to a point;

THENCE running North $50^{\circ}-30'-18''$ West, a distance of eighty-two and 50/100 (82.50) feet, through land of Cambridge Redevelopment Authority, to a point at other land of Cambridge Redevelopment Authority;

THENCE running North $29^{\circ}-16'-12''$ East, a distance of one hundred sixty-five and 51/100 (165.51) feet, by said other land of Cambridge Redevelopment Authority, to a point on the southerly line of Broad Canal, now land of Cambridge Redevelopment Authority;

THENCE running along said southerly line of said Broad Canal by the following eight (8) courses:

South $61^{\circ}-38'-47''$ East, a distance of one hundred ten and 00/100 (110.00) feet, to a point;

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South 60°-31'-18" East, a distance of fifty and 60/100 (50.60) feet, to a point;

South 63°-08'-16" East, a distance of fifty-three and 60/100 (53.60) feet, to a point;

South 63°-02'-38" East, a distance of thirty-nine and 36/100 (39.36) feet, to a point;

South 57°-56'-08" East, a distance of seventy-two and 24/100 (72.24) feet, to a point;

South 62°-49'-58" East, a distance of fifty-seven and 42/100 (57.42) feet, to a point;

South 60°-41'-38" East, a distance of seventy-two and 93/100 (72.93) feet, to a point; and

South 61°-14'-45" East, a distance of sixteen and 45/100 (16.45) feet, to said POINT OF BEGINNING.

Said parcel containing 75,653 square feet, more or less, being parts of the registered land described in Land Court Certificates of Title Nos. 121295 and 121296, in Book 736, at Pages 145 and 146, respectively, in the Middlesex Registry of Deeds, South District, and being shown as Parcel 1 on Land Court Plan No. 8046^a, entitled "Subdivision Plan of Land in Cambridge, Mass.", scale 40 feet to an inch, dated June 13, 1966, drawn by William S. Crocker, Inc., and being a subdivision of Lots A¹ and A² as shown on L.C.C. No. 8046^c.

Together with the right and easement to the Grantee, and its assigns, to pass and repass over the portions of land abutting the premises conveyed hereby and situated between said premises and Third Street and Broadway, respectively (said portions being shown on the Real Estate Tract Map hereinafter referred to as Tract No. 2B(R-E) and Tract No. 2B(R-S) and including the parcel shown as Parcel 2 on the Plan hereinbefore referred to, entitled "Subdivision Plan of Land in Cambridge, Mass.", dated June 13, 1966), until such time as such portions may be required by the Grantor or the City of Cambridge for street widening purposes, such right and easement being, however, subject to the condition that the Grantee shall maintain such portions in reasonably attractive appearance and subject to the right, hereby reserved, of the Grantor, and its successors and assigns, to enter thereon and install, reinstall, maintain, repair, alter, use and remove underground utilities and other services, all as more specifically provided in the Land Disposition Contract hereinafter referred to.

BK11152 PG464

Subject to easements granted to Cambridge Steam Corporation as set forth in instruments recorded with Middlesex Registry of Deeds, South District, Book 7057, Page 13, Book 7140, Page 588, and Book 7142, Page 599.

Subject further to an easement reserved by the Grantor for itself, its successors and assigns, to install, reinstall, maintain, repair, alter, use and remove underground utilities and other services along a strip eighteen (18) feet wide at the easterly boundary of the above-described premises conveyed hereby.

(For title, see Order of Taking by the Grantor, dated February 4, 1966 and recorded in Middlesex Registry of Deeds, South District, Book 11044, Page 1, and filed in said Registry District as Document No. 429225.)

Said premises are referred to as Tract No. 2B on a Plan entitled, "Real Estate Tract Map, National Aeronautics and Space Administration, Electronics Research Center, Cambridge, Massachusetts", dated April 12, 1966, and revised April 29, 1966, May 4, 1966, May 24, 1966 and May 31, 1966, a copy of which was recorded in the Middlesex South District Registry of Deeds on June 14, 1966 as Plan #715 of 1966.

The Grantee covenants and agrees, for itself and its assigns, that the Grantee and such assigns shall:

(a) Devote the granted premises to, and only to and in accordance with, the uses specified in the Urban Renewal Plan of Cambridge Redevelopment Authority for the Kendall Square Urban Renewal Project, Project No. K-107, in the City of Cambridge, Massachusetts, a copy of which has been filed in the office of the City Clerk of the City of Cambridge (said Plan being hereinafter referred to as the "Urban Renewal Plan"), as the same may be amended from time to time;

(b) To begin the building of its improvements on the granted premises within a reasonable time after conveyance;

(c) Not dispose of any right under the Land Disposition Contract hereinafter referred to with respect to the granted premises, or any right, title or interest in any part of the granted premises, prior to the completion of the improvements thereon without the written consent of the Grantor; and

(d) Not discriminate upon the basis of race, color, creed or national origin in the sale, lease, or rental, or in the use or occupancy of the granted premises, or any improvements erected or to be erected thereon, or any part thereof.

The covenants and agreements provided in the preceding paragraph shall be covenants running with the land and they shall, in any event, and without regard to technical classification or designation, legal or otherwise, and except only as otherwise

BK11152 PG465

specifically provided herein, to, to the fullest extent permitted by law and equity, binding for the benefit and in favor of, and enforceable by, the Grantor, its successors and assigns, the City of Cambridge, and the United States of America (in the case of the covenant and agreement provided in clause (d) of the preceding paragraph) against the Grantee and every successor in interest to the granted premises or any part thereof or any interest therein, and any party in possession or occupancy of the granted premises or any part thereof, provided, however, that the covenants and agreements provided in clauses (a), (b) and (c) of said preceding paragraph shall remain in effect until October 7, 1995 (at which time such covenants and agreements shall terminate) and those provided in clause (d) shall remain in effect until October 7, 2065. In amplification, and not in restriction, of the foregoing provisions, it is intended and agreed that the Grantor, its successors and assigns, and the City of Cambridge, shall each be deemed a beneficiary of the covenants and agreements provided in the preceding paragraph, and the United States of America shall be deemed a beneficiary of the covenant and agreement provided in clause (d), both for and in their or its own right and also for the purpose of protecting the interests of the community and any other parties, public or private, in whose favor or for whose benefit such covenants and agreements have been provided. Such covenants and agreements shall run in favor of the Grantor, its successors and assigns, the City of Cambridge, and the United States of America, for the entire period during which such covenants and agreements shall be in force and effect, without regard to whether the Grantor, its successors and assigns, or the City of Cambridge or the United States of America has been, is or remains the owner of any land or interest therein to, or in favor of, which such covenants and agreements relate. The Grantor, its successors and assigns (or, in the case of its failure, refusal or dissolution, then the City of Cambridge), shall have the right, in the event of any breach of any such covenant or agreement, and the United States of America shall have the right in the event of any breach of the covenant or agreement provided in clause (d) of the preceding paragraph, to exercise all the rights and remedies, and to maintain any actions at law or suits in equity or other proper proceedings to enforce the curing of such breach of covenant or agreement, to which it or any other beneficiaries of such covenant or agreement may be entitled.

This conveyance is made subject also to the additional agreements of the Grantee with respect to the granted premises and the terms and conditions set forth in a Land Disposition Contract, dated June 13, 1966, between the Grantor and the Grantee for the sale and redevelopment of the granted premises, recorded in the Middlesex South District Registry of Deeds, Book 11137, Page 315, and filed as Document No. 433534 in the Land Registration Office of said District.

BK 11152 PG 466

*For State Documentary Stamp
see original of this deed filed this day
in Land Court Records.*

This conveyance is free of and without any right on the part of the Grantor of reentry or reverter for condition broken.

WITNESS the execution hereof under seal this *29th* day of *June*, 1966.

(SEAL)

CAMBRIDGE REDEVELOPMENT AUTHORITY

By *Thomas J. Murphy*
Chairman



Paul S. Frank
Paul S. Frank
Administrative Director and
Secretary

(SEAL)

UNITED STATES OF AMERICA
acting by and through
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

ATTN:

By *W. Crawford Henley*
Acting Director
Electronics Research Center

Charles J. Delaney
Chief Counsel
Electronics Research Center

Suffolk
Worcester, ss.

COMMONWEALTH OF MASSACHUSETTS

June 29, 1966

Murphy Then personally appeared the above-named *Thomas J.* and acknowledged the foregoing instrument to be the free act and deed of Cambridge Redevelopment Authority, before me



Steven R. Rivkin
STEVEN R. RIVKIN
Notary Public
My commission expires: *Dec 8, 1972*

BK 13011 PG 258

DEED

KNOW ALL MEN BY THESE PRESENTS that CAMBRIDGE REDEVELOPMENT AUTHORITY, a public body politic and corporate, duly established under the Massachusetts General Laws in the County of Middlesex, Commonwealth of Massachusetts (hereinafter referred to as the Grantor), for and in consideration of the conveyance from the United States of America to Grantor by deed of even date herewith of two parcels of land more particularly described in said deed, less the sum of \$57,000 paid by the Grantor to the Grantee simultaneously with the delivery of such deed, does hereby grant to the UNITED STATES OF AMERICA, and its assigns (hereinafter referred to as the Grantee), with QUITCLAIM COVENANTS, the following described land located in the City of Cambridge, County of Middlesex, Commonwealth of Massachusetts:

TRACT 3B Indent

A certain parcel of land, situated in Cambridge, Middlesex County, Massachusetts, bounded and described as follows:

Beginning at a point on the easterly line of former Sixth Street 145.76 feet South 29°31'14" West from the intersection of said easterly line of former Sixth Street and the southerly line of former Potter Street;

Thence running by other land of the Grantee, South 60°30'18" East, a distance of 71.55 feet;

Thence running by said other land of the Grantee, South 29°29'42" West, a distance of 96.50 feet;

Thence running by said other land of the Grantee, North 60°30'18" West, a distance of 71.59 feet, to a point on said easterly line of former Sixth Street; and

Thence running North 29°31'14" East, a distance of approximately 96.50 feet, along said easterly line of former Sixth Street, to a point of beginning.

Containing 6,907 square feet, more or less, as shown on the plan hereinafter referred to.

For title reference, see Order of Taking by the Grantor, dated February 4, 1966 and recorded in Middlesex Registry of Deeds, Southern District, in Book 11044, Page 001.

Said premises are referred to as Tract No. 3B Indent, and are shown as a portion of Tract No. 3A on a plan entitled, "Real Estate Tract Map, National Aeronautics and Space Administration, Electronics Research Center, Cambridge, Massachusetts," dated April 12, 1966, and revised April 29, 1966, May 4, 1966, May 24, 1966 and May 31, 1966, recorded with the Middlesex South District Registry of Deeds as Plan No. 715 of 1966 in Book 11136 Page 315.

TRACT NO. 10

A certain parcel of land, situated in Cambridge, Middlesex County, Massachusetts, bounded and described as follows:

BK 13011 PG 259

Beginning at a point on the southerly line of Potter Street at the northeasterly corner of other land of the Grantor referred to as Tract No. 2B on the Real Estate Tract Map hereinafter referred to;

Thence running South $60^{\circ}31'14''$ East, a distance of 160.81 feet, along the southerly line of Potter Street, to a point;

Thence running Southwesterly, a distance of 166.55 feet, to a point on the northerly line of the former Broad Canal;

Thence running Northwesterly by said other land of the Grantee, a distance of 167.88 feet, along the northerly line of the former Broad Canal; and

Thence running Northeasterly by said other land of the Grantee, a distance of 169.10 feet; to the point of beginning.

Containing 27,572 square feet, more or less, as shown on the plan hereinafter referred to.

Together with the right and easement to the Grantee, and its assigns, to pass and repass over the portion of land abutting the premises conveyed hereby and situated between said premises and Third Street (said portion being shown on the Real Estate Tract Map hereinafter referred to as Tract No. 10(R-E), until such time as such portion may be required by the Grantor or the City of Cambridge for street widening purposes, such right and easement being, however, subject to the condition that the Grantee shall maintain such portion in reasonably attractive appearance and subject to the right, hereby reserved, of the Grantor, and its successors and assigns, to enter thereon and install, reinstall, maintain, repair, alter, use and remove underground utilities and other services, all as more specifically provided in the Land Disposition Contract hereinafter referred to.

Subject to an easement reserved by the Grantor for itself, its successors and assigns, to install, reinstall, maintain, repair, alter, use and remove underground utilities and other services along a strip eighteen (18) feet wide at the easterly boundary of the above-described premises conveyed hereby.

Being a portion of the premises conveyed to the Grantor by deed dated January 12, 1970 and recorded with Middlesex Registry of Deeds, Southern District, in Book 11790, Page 101.

Said premises are referred to as Tract No. 10 on a plan entitled, "Real Estate Tract Map, National Aeronautics and Space Administration, Electronics Research Center, Cambridge, Massachusetts," dated April 12, 1966, and revised April 29, 1966, May 4, 1966, May 24, 1966 and May 31, 1966 and recorded with Middlesex Registry of Deeds, South District as Plan No. 715 of 1966 in Book 11137, Page 315.

The Grantee covenants and agrees, for itself and its assigns, that the Grantee and such assigns shall:

(a) devote the granted premises to, and only to and in accordance with, the uses specified in the Urban Renewal Plan of Cambridge Redevelopment Authority for the Kendall Square Urban Renewal Project, Project No.

BK13011 PG260

R-107, in the City of Cambridge, Massachusetts, a copy of which has been filed in the office of the City Clerk of the City of Cambridge (said Plan being hereinafter referred to as the "Urban Renewal Plan"), as the same may be amended from time to time; and

(b) not discriminate upon the basis of race, color, religion, sex or national origin in the sale, lease, or rental, or in the use or occupancy of the granted premises, or any improvements erected or to be erected thereon, or any part thereof.

The covenants and agreements provided in the preceding paragraph shall be covenants running with the land and they shall, in any event, and without regard to technical classification or designation, legal or otherwise, and except only as otherwise specifically provided herein, be, to the fullest extent permitted by law and equity, binding for the benefit and in favor of, and enforceable by, the Grantor, its successors and assigns, the City of Cambridge, and the United States of America (in the case of the covenant and agreement provided in clause (b) of the preceding paragraph) against the Grantee and every successor in interest to the granted premises or any part thereof or any interest therein, and any party in possession or occupancy of the granted premises or any part thereof, provided, however, that the covenants and agreements provided in clause (a) of said preceding paragraph shall remain in effect until October 7, 1995 (at which time such covenants and agreements shall terminate) and those provided in clause (b) shall remain in effect until October 7, 2065. In amplification, and not in restriction, of the foregoing provisions, it is intended and agreed that the Grantor, its successors and assigns, and the City of Cambridge, shall each be deemed a beneficiary of the covenants and agreements provided in the preceding paragraph, and the United States of America shall be deemed a beneficiary of the covenant and agreement provided in clause (b), both for and in their or its own right and also for the purpose of protecting the interests of the community and any other parties, public or private, in whose favor or for whose benefit such covenants and agreements have been provided. Such covenants and agreements shall run in favor of the Grantor, its successors and assigns, the City of Cambridge, and the United States of America, for the entire period during which such covenants and agreements shall be in force and effect, without regard to whether the Grantor, its successors and assigns, or the City of Cambridge or the United States of America has been, is or remains the owner of any land or interest therein to, or in favor of, which such covenants and agreements relate. The Grantor, its successors and assigns (or, in the case of its failure, refusal or dissolution, then the City of Cambridge), shall have the right, in the event of any breach of any such covenant or agreement, and the United States of America shall have the right in the event of any breach of the covenant or agreement provided in clause (b) of the preceding paragraph, to exercise all the rights and remedies, and to maintain any actions at law or suits in equity or other proper proceedings to enforce the curing of such breach of covenant or agreement, to which it or any other beneficiaries of such covenant or agreement may be entitled.

It is understood and agreed that: (a) the granted premises shall be used by the Grantee for governmental purposes in accordance with the Urban Renewal Plan, as the same may be amended from time to time, and with the provisions of 42 U.S.C. 1455(b), and (b) upon the termination by the Grantee of

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the use of the granted premises as aforesaid, any subsequent resale thereof by the Grantee may be on terms no more restrictive than any other conveyances made pursuant to the Urban Renewal Plan.

This conveyance is made subject also to the additional agreements of the Grantee with respect to the granted premises and the terms and conditions set forth in a Land Disposition Contract, dated June 13, 1966, between the Grantor and the Grantee for the sale and redevelopment of the granted premises, recorded in the Middlesex South District Registry of Deeds, Book 11137, Page 315, and filed as Document No. 433534 in the Land Registration Office of said District as supplemented from time to time.

The address of the Grantee is:

General Services Administration
Region 1
John W. McCormack
Post Office and Courthouse
Boston, Massachusetts 02109

This conveyance is free of and without any right on the part of the Grantor of reentry or reverter for condition broken.

WITNESS the execution hereof under seal this 7th day of July, 1976.



CAMBRIDGE REDEVELOPMENT AUTHORITY

By

Thomas J. Murphy
Thomas J. Murphy
Chairman

(SEAL)

UNITED STATES OF AMERICA
acting by and through
GENERAL SERVICES ADMINISTRATION

By

Robert L. Padellaro
Robert L. Padellaro

COMMONWEALTH OF MASSACHUSETTS

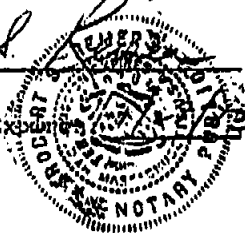
Middlesex, ss.

July 7, 1976

Then personally appeared the above-named Thomas J. Murphy and acknowledged the foregoing instrument to be the free act and deed of Cambridge Redevelopment Authority, before me,

Robert L. Padellaro
Notary Public

My Commission Expires 1978



CORPS OF ENGINEERS

U.S. ARMY

145 7/75

PROJECT MAP

DATE OF MAP
1975

LOCATION OF PROJECT

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CITY
CAMBRIDGE

STATE
MASSACHUSETTS

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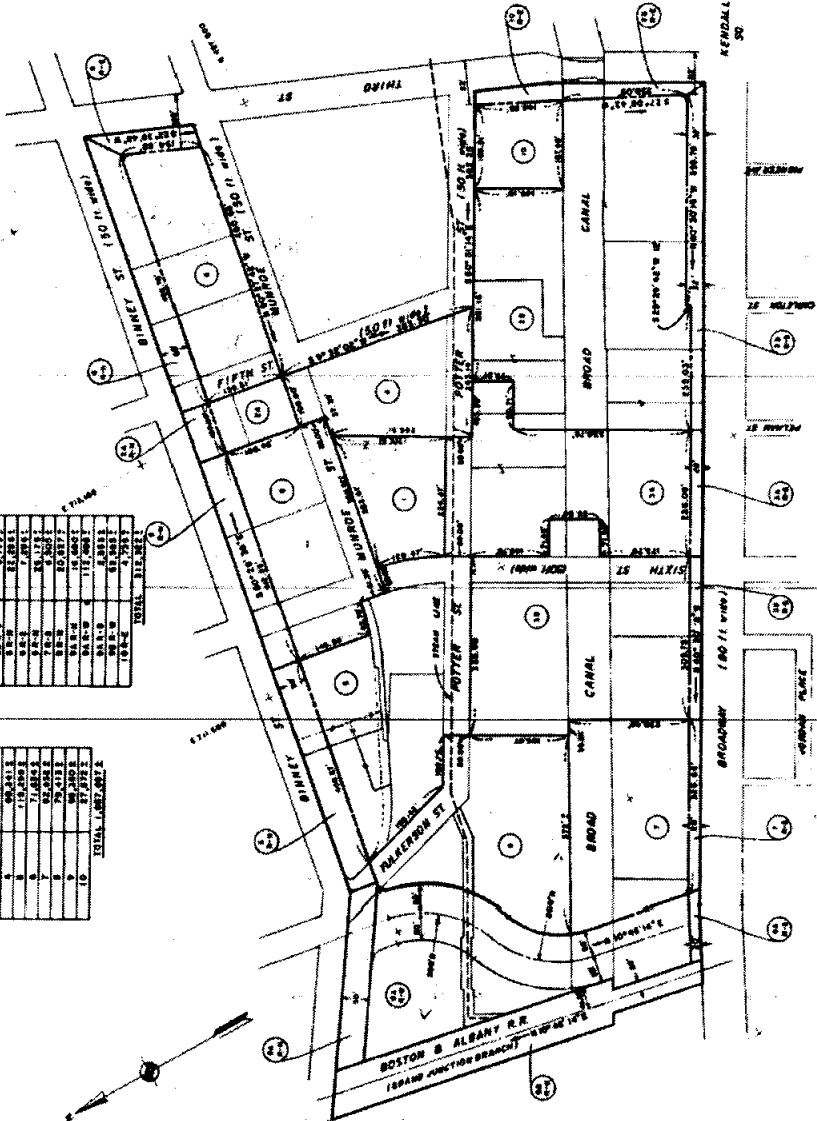
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The original of this map is at a scale of 1" = 50 feet and is on file at the Department of the Army, New England Division, Corps of Engineers, 128 Tropical Road, Millham, Mass. 02156. Scale of this map 1" = 150 feet.

Map has been compiled from deeds on record, surveys by others and computations.

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SEE SHEET 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1544, 1545, 1546, 1547, 1548, 1549, 1550, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1654, 1655, 1656, 1657, 1658, 1659, 1660, 1661, 1662, 1663, 1664, 1665, 1666, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1675, 1676, 1677, 1678, 1679, 1680, 1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 183



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Form 1075

NOTICE OF ACTIVITY AND USE LIMITATION M.G.L. c. 21E, § 6 and 310 CMR 40.0000

Disposal Site Name: Volpe National Transportation Systems Center, 55 Broadway, Cambridge, MA
 DEP Release Tracking No.(s): 3-26067

This Notice of Activity and Use Limitation ("Notice") is made as of this 13th day of May, 2011, by the United States of America, 55 Broadway, Cambridge, MA, together with his/her/its/their successors and assigns (collectively "Owner").

WITNESSETH:

WHEREAS, the United States of America, is the owner in fee simple of those certain parcels of land located in Cambridge, Middlesex County, Massachusetts with the buildings and improvements thereon, pursuant to deeds recorded with the Middlesex (South District) Registry of Deeds in Book 11152, Page 462 and Book 13011 Pages 258-259;

WHEREAS, said parcel(s) of land, which is more particularly bounded and described in Exhibit A, attached hereto and made a part hereof ("Property") is subject to this Notice of Activity and Use Limitation. The Property is shown as Tract 2B and Tract 10 on a plan recorded in the Middlesex (South District) Registry of Deeds in Plan Book 11137, Plan 315;

WHEREAS, the Property comprises part of a disposal site as the result of a release of oil and/or hazardous material. Exhibit B is a sketch plan showing the relationship of the Property subject to this Notice of Activity and Use Limitation to the boundaries of said disposal site existing within the limits of the Property and to the extent such boundaries have been established. Exhibit B is attached hereto and made a part hereof; and

WHEREAS, one or more response actions have been selected for the Disposal Site in accordance with M.G.L. c. 21E ("Chapter 21E") and the Massachusetts Contingency Plan, 310 CMR 40.0000 ("MCP"). Said response actions are based upon (a) the restriction of human access to and contact with oil and/or hazardous material in soil and/or (b) the restriction of certain activities occurring in, on, through, over or under the Property. The basis for such restrictions is set forth in an Activity and Use Limitation Opinion ("AUL Opinion"), dated May 12, 2011, (which is attached

hereto as Exhibit C and made a part hereof);

NOW, THEREFORE, notice is hereby given that the activity and use limitations set forth in said AUL Opinion are as follows:

1. Activities and Uses Consistent with the AUL Opinion. The AUL Opinion provides that a condition of No Significant Risk to health, safety, public welfare or the environment exists for any foreseeable period of time (pursuant to 310 CMR 40.0000) so long as any of the following activities and uses occur on the Property:

(i) Site activities and uses including, but not necessarily limited to, recreational activities in the playground and the surrounding field, pedestrian traffic, and/or vehicular traffic which do not cause and/or result in the disturbance of contaminated soil located at depths greater than 6 inches below surface grade;

(ii) Excavation associated with short-term (three months or less) landscaping activities, underground trenching activities, and/or construction activities by adult workers which are likely to disturb contaminated soil located at depths up to 3 feet below surface grade;

(iii) Excavation associated with short-term (three months or less) underground utility and/or construction which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade, provided that such activities are conducted in accordance with a Soil Management Plan and a Health and Safety Plan prepared and implemented in accordance with Obligations (i) and (ii) of this AUL Opinion prior to the commencement of such activity, the soil management procedures of the MCP cited at 310 CMR 40.0030, and all applicable worker health and safety practices pursuant to 310 CMR 40.0018;

(iv) Activities and uses not identified by this Notice as being inconsistent with maintaining a condition of No Significant Risk; and

(v) Such other activities or uses which, in the Opinion of an LSP, shall present no greater risk of harm to health, safety, public welfare or the environment than the activities and uses set forth in this paragraph.

2. Activities and Uses Inconsistent with the AUL Opinion. Activities and uses which are inconsistent with the objectives of this Notice of Activity and Use Limitation, and which, if implemented at the Property, may result in a significant risk of harm to health, safety, public welfare or the environment or in a substantial hazard, are as follows:

(i) Any short term (three months or less) activity including, but not limited to, excavation which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade without the prior development and implementation of a Soil Management Plan and a Health and Safety Plan in accordance with Obligations (i) and (ii) of this Opinion;

- (ii) Any long-term (greater than three months) activity which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade;
- (iii) Relocation of contaminated soil currently located at depths greater than 3 feet below surface grade to a shallower depth, unless such activity is first evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk;
- (iv) Relocation of contaminated soil currently located between 6 inches and 3 feet below surface grade to a shallower depth, unless such activity is first evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk;
- (v) Use of the property as a residence; and
- (vi) Construction of any building at the site which does not meet the assumptions of the vapor intrusion model and risk characterization used to support the Response Action Outcome for the site without prior evaluation by a LSP who renders an Opinion which states that the use of such building is consistent with maintaining a condition of No Significant Risk.

3. Obligations and Conditions Set Forth in the AUL Opinion. If applicable, obligations and/or conditions to be undertaken and/or maintained at the Property to maintain a condition of No Significant Risk as set forth in the AUL Opinion shall include the following:

- (i) A Soil Management Plan must be prepared by an LSP and implemented prior to the commencement of any activity which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade within the AUL Area. The Soil Management Plan must be prepared in accordance with the guidelines discussed in the Activity and Use Limitation Opinion attached hereto as Exhibit C;
- (ii) A Health and Safety Plan must be prepared and implemented prior to the commencement of any activity which is likely to disturb the contaminated soil located at depths greater than 3 feet below surface grade within the AUL Area. The Health and Safety Plan must be prepared in accordance with the guidelines discussed in the Activity and Use Limitation Opinion attached hereto as Exhibit C;
- (iii) The contaminated soil located at depths greater than 3 feet below surface grade within the AUL Area must remain at depth and may not be relocated, unless such activity is first appropriately evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk;
- (iv) The contaminated soil located at depths between 6 inches and 3 feet below surface grade within the AUL Area must remain at these depths and may not be

relocated, unless such activity is first appropriately evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk. A 6-inch layer of loam at surface grade will always be maintained within the unpaved areas;

(v) Specifications for future buildings to be constructed at the site must be compared to the assumptions of the vapor intrusion model and risk characterization used to support the Response Action Outcome for the site and re-evaluated by an LSP who must render an Opinion as to whether site conditions, activities, and/or uses associated with the future building potentially pose a significant risk of harm to human health; and

(vi) Response actions must be conducted in accordance with the Massachusetts Contingency Plan, 310 CMR 40.0000, should an LSP Opinion rendered pursuant to Obligation (i) conclude that future site uses and activities, including exposures associated with future building construction, are inconsistent with maintaining a condition of No Significant Risk.

4. Proposed Changes in Activities and Uses. Any proposed changes in activities and uses at the Property which may result in higher levels of exposure to oil and/or hazardous material than currently exist shall be evaluated by an LSP who shall render an Opinion, in accordance with 310 CMR 40.1080 *et seq.*, as to whether the proposed changes will present a significant risk of harm to health, safety, public welfare or the environment. Any and all requirements set forth in the Opinion to meet the objective of this Notice shall be satisfied before any such activity or use is commenced.

5. Violation of a Response Action Outcome. The activities, uses and/or exposures upon which this Notice is based shall not change at any time to cause a significant risk of harm to health, safety, public welfare, or the environment or to create substantial hazards due to exposure to oil and/or hazardous material without the prior evaluation by an LSP in accordance with 310 CMR 40.1080 *et seq.*, and without additional response actions, if necessary, to achieve or maintain a condition of No Significant Risk or to eliminate substantial hazards.

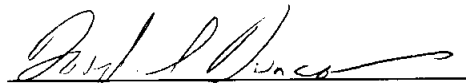
If the activities, uses, and/or exposures upon which this Notice is based change without the prior evaluation and additional response actions determined to be necessary by an LSP in accordance with 310 CMR 40.1080 *et seq.*, the owner or operator of the Property subject to this Notice at the time that the activities, uses and/or exposures change, shall comply with the requirements set forth in 310 CMR 40.0020.

6. Incorporation Into Deeds, Mortgages, Leases, and Instruments of Transfer. This Notice shall be incorporated either in full or by reference into all future deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer, whereby an interest in and/or a right to use the Property or a portion thereof is conveyed.

Owner hereby authorizes and consents to the filing and recordation and/or registration

of this Notice, said Notice to become effective when executed under seal by the undersigned LSP, and recorded and/or registered with the appropriate Registry(ies) of Deeds and/or Land Registration Office(s).

WITNESS the execution hereof under seal this 12th day of May, 2011.



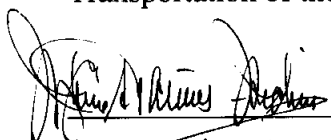
United States of America
Department of Transportation
David Duncan
Chief, Real Property and Facility Services

COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss

May 12, 2011

On this 12 day of May, 2011, before me, the undersigned notary public, personally appeared David Duncan proved to me through satisfactory evidence of identification, which were MS DOT ID, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose as Director of Administrations for the Department of Transportation of the United States of America.



(official signature and seal of notary)

My Commission expires May 30, 2014

The undersigned LSP hereby certifies that he executed the aforesaid Activity and Use Limitation Opinion attached hereto as Exhibit C and made a part hereof and that in his Opinion this Notice of Activity and Use Limitation is consistent with the terms set forth in said Activity and Use Limitation Opinion.

Date: 5/13/2011

Farooq Siddique
Farooq Siddique, LSP, PE
FS Engineers, Inc. ✓

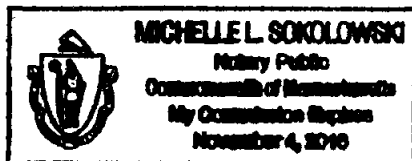
COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss

5/13, 2011

On this 13th day of May, 2011, before me, the undersigned notary public, personally appeared Farooq Siddique, proved to me through satisfactory evidence of identification, which were MA Drivers License, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose as LSP for the Department of Transportation of the United States of America.

Michelle L. Sokolowski
(official signature and seal of notary)

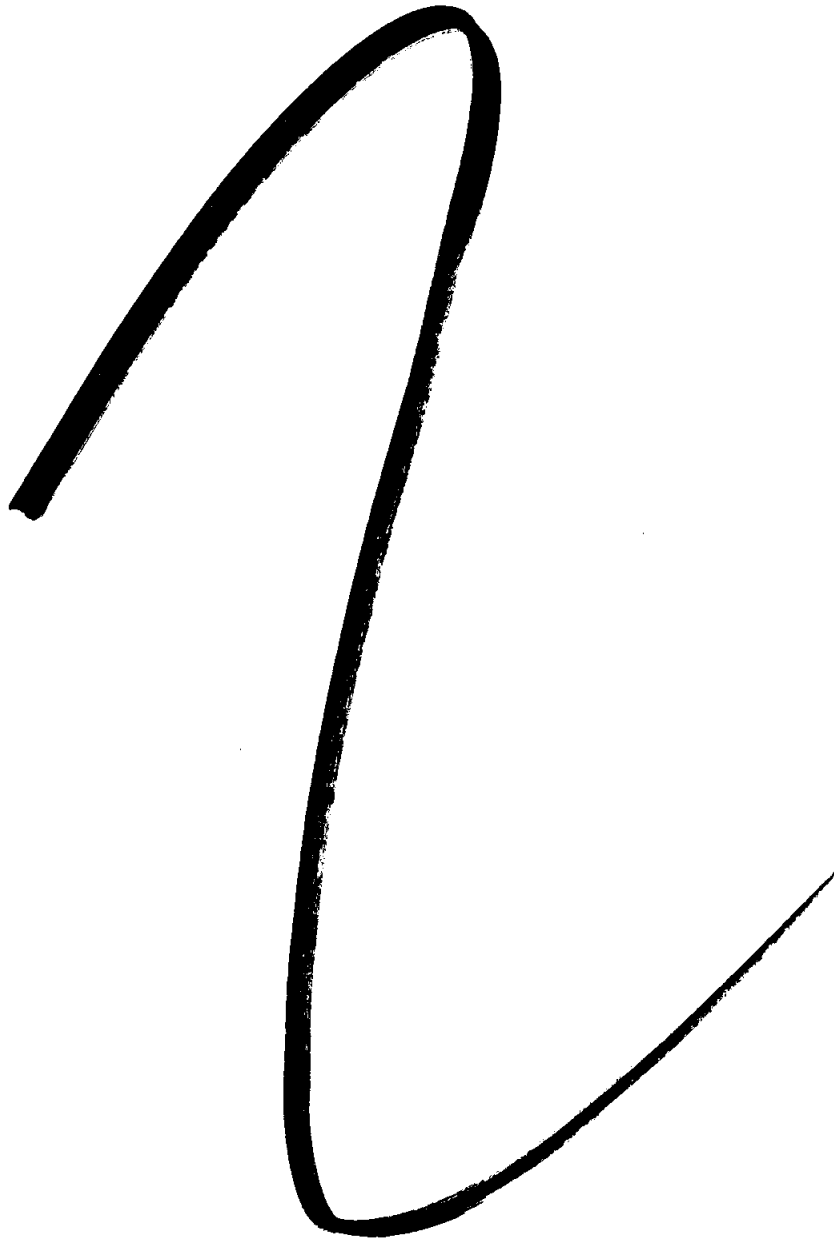


Upon recording, return to:

Farooq Siddique
FS Engineers, Inc.
2 Clock Tower Place, Suite 630
Maynard, MA 01754

EXHIBIT A

Legal description of parcel of land containing the area subject to the Activity and Use Limitation.



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BK11152 PG481

DEED

KNOW ALL MEN BY THESE PRESENTS THAT CAMBRIDGE REDEVELOPMENT AUTHORITY, a public body politic and corporate, duly established under the Massachusetts Housing Authority Law in the County of Middlesex, Commonwealth of Massachusetts (hereinafter referred to as the Grantor), for and in consideration of the sum of Six Hundred Fifty-Eight Thousand Dollars (\$658,000), the receipt of which sum is hereby acknowledged by the Grantor, does hereby grant to the UNITED STATES OF AMERICA, and its assigns (hereinafter referred to as the Grantee), with QUITCLAIM COVENANTS, the following described land located in the City of Cambridge, County of Middlesex, Commonwealth of Massachusetts:

A certain parcel of land, situated in Cambridge, Middlesex County, Massachusetts, bounded and described as follows:

Beginning at a point on the southerly line of Potter Street, which point is 189.97 feet distant northwesterly from the intersection of the southerly line of Potter Street and the westerly line of Third Street, said point of beginning being also on the division line between land of Badger Manufacturing Corporation and land of Cambridge Redevelopment Authority; thence running by land of Badger Manufacturing Corporation South 29° 34' 08" West, a distance of 169.10 feet and South 61° 26' 13" East, a distance of 167.88 feet, to a point; thence running by other land of the Cambridge Redevelopment Authority South 27° 08' 43" West, a distance of 217.21 feet, to a point of curvature and by a curve to the right having a radius of 20.00 feet, an arc length of 32.24 feet, to a point of tangency, said point of tangency being 32.0 feet distant northerly from and measured at right angles to the northerly line of Broadway; thence running North 60° 30' 18" West, by a line which is 32.00 feet distant northerly from and parallel with the northerly line of Broadway, by the land of the Cambridge Redevelopment Authority, a distance of 374.82 feet, to a point; thence running South 29° 29' 42" East, a distance of 20.00 feet, by other land of the Cambridge Redevelopment Authority to a point which is 20.00 feet distant northerly from and measured at right angles to the northerly line of Broadway; thence running North 60° 30' 18" West, by a line which is 20.00 feet distant northerly from and parallel with the northerly line of Broadway, by other land of the Cambridge Redevelopment Authority, a distance of 235.03 feet, to a point; thence running by other land of the Cambridge Redevelopment Authority North 29° 44' 57" East, a distance of 338.76 feet, South 60° 30' 18" East, a distance of 90.71 feet and North 29° 29' 42" East, a distance of 77.37 feet, to a point in the southerly line of Potter Street; thence running South 60° 31' 14" East, a distance of 361.18 feet along said southerly line of Potter Street, to the point of beginning.

Containing 219,370 square feet, more or less.

BK11152 PG462

Included within the above-described premises conveyed hereby is certain registered land described as follows:

A certain parcel of land situated in the City of Cambridge, County of Middlesex, and Commonwealth of Massachusetts, being more particularly bounded and described as follows:

BEGINNING at a POINT OF BEGINNING which is located by beginning on the westerly line of Third Street at a point of tangency of a corner rounding from Broadway; thence running North $29^{\circ}-37'-59''$ East, a distance of one hundred seventy-seven and $00/100$ (177.00) feet, along said westerly line of said Third Street, to a point on the southerly line of Broad Canal, now land of Cambridge Redevelopment Authority; and thence running North $61^{\circ}-14'-45''$ West, a distance of twenty-eight and $94/100$ (28.94) feet, along said southerly line of said Broad Canal to said POINT OF BEGINNING;

THENCE running South $27^{\circ}-08'-43''$ West, a distance of one hundred thirty-eight and $89/100$ (138.89) feet, through land of said Cambridge Redevelopment Authority, to a point of curvature;

THENCE running by a curve to the right, having a radius of twenty and $00/100$ (20.00) feet, an arc length of thirty-two and $24/100$ (32.24) feet, through land of Cambridge Redevelopment Authority, to a point of tangency;

THENCE running North $60^{\circ}-30'-18''$ West, a distance of three hundred seventy-four and $92/100$ (374.92) feet, through land of Cambridge Redevelopment Authority, to a point;

THENCE running South $29^{\circ}-29'-42''$ West, a distance of twelve and $00/100$ (12.00) feet, through land of Cambridge Redevelopment Authority, to a point;

THENCE running North $60^{\circ}-30'-18''$ West, a distance of eighty-two and $50/100$ (82.50) feet, through land of Cambridge Redevelopment Authority, to a point at other land of Cambridge Redevelopment Authority;

THENCE running North $29^{\circ}-16'-12''$ East, a distance of one hundred sixty-five and $51/100$ (165.51) feet, by said other land of Cambridge Redevelopment Authority, to a point on the southerly line of Broad Canal, now land of Cambridge Redevelopment Authority;

THENCE running along said southerly line of said Broad Canal by the following eight (8) courses:

South $61^{\circ}-38'-47''$ East, a distance of one hundred ten and $00/100$ (110.00) feet, to a point;

BK11152 PG403

South 60°-31'-18" East, a distance of fifty and 60/100 (50.60) feet, to a point;

South 63°-08'-16" East, a distance of fifty-three and 60/100 (53.60) feet, to a point;

South 63°-02'-38" East, a distance of thirty-nine and 36/100 (39.36) feet, to a point;

South 57°-56'-08" East, a distance of seventy-two and 24/100 (72.24) feet, to a point;

South 62°-49'-58" East, a distance of fifty-seven and 42/100 (57.42) feet, to a point;

South 60°-41'-38" East, a distance of seventy-two and 93/100 (72.93) feet, to a point; and

South 61°-14'-45" East, a distance of sixteen and 45/100 (16.45) feet, to said POINT OF BEGINNING.

Said parcel containing 75,653 square feet, more or less, being parts of the registered land described in Land Court Certificates of Title Nos. 121295 and 121296, in Book 736, at Pages 145 and 146, respectively, in the Middlesex Registry of Deeds, South District, and being shown as Parcel 1 on Land Court Plan No. 8046^a, entitled "Subdivision Plan of Land in Cambridge, Mass.", scale 40 feet to an inch, dated June 13, 1966, drawn by William S. Crocker, Inc., and being a subdivision of Lots A¹ and A² as shown on L.C.C. No. 8046^c.

Together with the right and easement to the Grantee, and its assigns, to pass and repass over the portions of land abutting the premises conveyed hereby and situated between said premises and Third Street and Broadway, respectively (said portions being shown on the Real Estate Tract Map hereinafter referred to as Tract No. 2B(R-E) and Tract No. 2B(R-S) and including the parcel shown as Parcel 2 on the Plan hereinbefore referred to, entitled "Subdivision Plan of Land in Cambridge, Mass.", dated June 13, 1966), until such time as such portions may be required by the Grantor or the City of Cambridge for street widening purposes, such right and easement being, however, subject to the condition that the Grantee shall maintain such portions in reasonably attractive appearance and subject to the right, hereby reserved, of the Grantor, and its successors and assigns, to enter thereon and install, reinstall, maintain, repair, alter, use and remove underground utilities and other services, all as more specifically provided in the Land Disposition Contract hereinafter referred to.

BK11152 PG464

Subject to easements granted to Cambridge Steam Corporation as set forth in instruments recorded with Middlesex Registry of Deeds, South District, Book 7057, Page 13, Book 7140, Page 583, and Book 7142, Page 599.

Subject further to an easement reserved by the Grantor for itself, its successors and assigns, to install, reinstall, maintain, repair, alter, use and remove underground utilities and other services along a strip eighteen (18) feet wide at the easterly boundary of the above-described premises conveyed hereby.

(For title, see Order of Taking by the Grantor, dated February 4, 1966 and recorded in Middlesex Registry of Deeds, South District, Book 11044, Page 1, and filed in said Registry District as Document No. 429225.)

Said premises are referred to as Tract No. 2B on a Plan entitled, "Real Estate Tract Map, National Aeronautics and Space Administration, Electronics Research Center, Cambridge, Massachusetts", dated April 12, 1966, and revised April 29, 1966, May 4, 1966, May 24, 1966 and May 31, 1966, a copy of which was recorded in the Middlesex South District Registry of Deeds on June 14, 1966 as Plan #715 of 1966.

The Grantee covenants and agrees, for itself and its assigns, that the Grantee and such assigns shall:

(a) Devote the granted premises to, and only to and in accordance with, the uses specified in the Urban Renewal Plan of Cambridge Redevelopment Authority for the Kendall Square Urban Renewal Project, Project No. K-107, in the City of Cambridge, Massachusetts, a copy of which has been filed in the office of the City Clerk of the City of Cambridge (said Plan being hereinafter referred to as the "Urban Renewal Plan"), as the same may be amended from time to time;

(b) To begin the building of its improvements on the granted premises within a reasonable time after conveyance;

(c) Not dispose of any right under the Land Disposition Contract hereinafter referred to with respect to the granted premises, or any right, title or interest in any part of the granted premises, prior to the completion of the improvements thereon without the written consent of the Grantor; and

(d) Not discriminate upon the basis of race, color, creed or national origin in the sale, lease, or rental, or in the use or occupancy of the granted premises, or any improvements erected or to be erected thereon, or any part thereof.

The covenants and agreements provided in the preceding paragraph shall be covenants running with the land and they shall, in any event, and without regard to technical classification or designation, legal or otherwise, and except only as otherwise

BK11152 PG465

specifically provided herein, to, to the fullest extent permitted by law and equity, binding for the benefit and in favor of, and enforceable by, the Grantor, its successors and assigns, the City of Cambridge, and the United States of America (in the case of the covenant and agreement provided in clause (d) of the preceding paragraph) against the Grantee and every successor in interest to the granted premises or any part thereof or any interest therein, and any party in possession or occupancy of the granted premises or any part thereof, provided, however, that the covenants and agreements provided in clauses (a), (b) and (c) of said preceding paragraph shall remain in effect until October 7, 1995 (at which time such covenants and agreements shall terminate) and those provided in clause (d) shall remain in effect until October 7, 2065. In amplification, and not in restriction, of the foregoing provisions, it is intended and agreed that the Grantor, its successors and assigns, and the City of Cambridge, shall each be deemed a beneficiary of the covenants and agreements provided in the preceding paragraph, and the United States of America shall be deemed a beneficiary of the covenant and agreement provided in clause (d), both for and in their or its own right and also for the purpose of protecting the interests of the community and any other parties, public or private, in whose favor or for whose benefit such covenants and agreements have been provided. Such covenants and agreements shall run in favor of the Grantor, its successors and assigns, the City of Cambridge, and the United States of America, for the entire period during which such covenants and agreements shall be in force and effect, without regard to whether the Grantor, its successors and assigns, or the City of Cambridge or the United States of America has been, is or remains the owner of any land or interest therein to, or in favor of, which such covenants and agreements relate. The Grantor, its successors and assigns (or, in the case of its failure, refusal or dissolution, then the City of Cambridge), shall have the right, in the event of any breach of any such covenant or agreement, and the United States of America shall have the right in the event of any breach of the covenant or agreement provided in clause (d) of the preceding paragraph, to exercise all the rights and remedies, and to maintain any actions at law or suits in equity or other proper proceedings to enforce the curing of such breach of covenant or agreement, to which it or any other beneficiaries of such covenant or agreement may be entitled.

This conveyance is made subject also to the additional agreements of the Grantee with respect to the granted premises and the terms and conditions set forth in a Land Disposition Contract, dated June 13, 1986, between the Grantor and the Grantee for the sale and redevelopment of the granted premises, recorded in the Middlesex South District Registry of Deeds, Book 11157, Page 315, and filed as Document No. 433534 in the Land Registration Office of said District.

BK 11152 PG 466

*For State Documentary Stamp
See original of this deed filed this day
in Land Court Records.*

This conveyance is free of and without any right on the part of the Grantor of reentry or reverter for condition broken.

WITNESS the execution hereof under seal this 29th day of June, 1966.

(SEAL)

CAMBRIDGE REDEVELOPMENT AUTHORITY

By Thomas J. Murphy
Chairman



By Paul S. Frank
Administrative Director and
Secretary

(SEAL)

UNITED STATES OF AMERICA
acting by and through
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

ATTN:

By W. Crawford Henry
Acting Director
Electronics Research Center

Charles J. Delaney
Chief Counsel
Electronics Research Center

Suffolk
Massachusetts, ss.

COMMONWEALTH OF MASSACHUSETTS

June 29, 1966

Then personally appeared the above-named Thomas J. Murphy and acknowledged the foregoing instrument to be the free act and deed of Cambridge Redevelopment Authority, before me



Steven R. Rivkin
STEVEN R. RIVKIN
Notary Public
My commission expires: Dec 8, 1972

BK 13011 PG 258

DEED

KNOW ALL MEN BY THESE PRESENTS that CAMBRIDGE REDEVELOPMENT AUTHORITY, a public body politic and corporate, duly established under the Massachusetts General Laws in the County of Middlesex, Commonwealth of Massachusetts (hereinafter referred to as the Grantor), for and in consideration of the conveyance from the United States of America to Grantor by deed of even date herewith of two parcels of land more particularly described in said deed, less the sum of \$57,000 paid by the Grantor to the Grantee simultaneously with the delivery of such deed, does hereby grant to the UNITED STATES OF AMERICA, and its assigns (hereinafter referred to as the Grantee), with QUITCLAIM COVENANTS, the following described land located in the City of Cambridge, County of Middlesex, Commonwealth of Massachusetts:

TRACT 3B Indent

A certain parcel of land, situated in Cambridge, Middlesex County, Massachusetts, bounded and described as follows:

Beginning at a point on the easterly line of former Sixth Street 145.76 feet South 29°31'14" West from the intersection of said easterly line of former Sixth Street and the southerly line of former Potter Street;

Thence running by other land of the Grantee, South 60°30'18" East, a distance of 71.55 feet;

Thence running by said other land of the Grantee, South 29°29'42" West, a distance of 96.50 feet;

Thence running by said other land of the Grantee, North 60°30'18" West, a distance of 71.59 feet, to a point on said easterly line of former Sixth Street; and

Thence running North 29°31'14" East, a distance of approximately 96.50 feet, along said easterly line of former Sixth Street, to a point of beginning.

Containing 6,907 square feet, more or less, as shown on the plan hereinafter referred to.

For title reference, see Order of Taking by the Grantor, dated February 4, 1966 and recorded in Middlesex Registry of Deeds, Southern District, in Book 11044, Page 001.

Said premises are referred to as Tract No. 3B Indent, and are shown as a portion of Tract No. 3A on a plan entitled, "Real Estate Tract Map, National Aeronautics and Space Administration, Electronics Research Center, Cambridge, Massachusetts," dated April 12, 1966, and revised April 29, 1966, May 4, 1966, May 24, 1966 and May 31, 1966, recorded with the Middlesex South District Registry of Deeds as Plan No. 715 of 1966 in Book 11136 Page 315.

TRACT NO. 10

A certain parcel of land, situated in Cambridge, Middlesex County, Massachusetts, bounded and described as follows:

BK 13011 PG 259

Beginning at a point on the southerly line of Potter Street at the northeasterly corner of other land of the Grantor referred to as Tract No. 2B on the Real Estate Tract Map hereinafter referred to;

Thence running South $60^{\circ}31'14''$ East, a distance of 160.81 feet, along the southerly line of Potter Street, to a point;

Thence running Southwesterly, a distance of 166.55 feet, to a point on the northerly line of the former Broad Canal;

Thence running Northwesterly by said other land of the Grantee, a distance of 167.88 feet, along the northerly line of the former Broad Canal; and

Thence running Northeasterly by said other land of the Grantee, a distance of 169.10 feet; to the point of beginning.

Containing 27,572 square feet, more or less, as shown on the plan hereinafter referred to.

Together with the right and easement to the Grantee, and its assigns, to pass and repass over the portion of land abutting the premises conveyed hereby and situated between said premises and Third Street (said portion being shown on the Real Estate Tract Map hereinafter referred to as Tract No. 10(R-E)), until such time as such portion may be required by the Grantor or the City of Cambridge for street widening purposes, such right and easement being, however, subject to the condition that the Grantee shall maintain such portion in reasonably attractive appearance and subject to the right, hereby reserved, of the Grantor, and its successors and assigns, to enter thereon and install, reinstall, maintain, repair, alter, use and remove underground utilities and other services, all as more specifically provided in the Land Disposition Contract hereinafter referred to.

Subject to an easement reserved by the Grantor for itself, its successors and assigns, to install, reinstall, maintain, repair, alter, use and remove underground utilities and other services along a strip eighteen (18) feet wide at the easterly boundary of the above-described premises conveyed hereby.

Being a portion of the premises conveyed to the Grantor by deed dated January 12, 1970 and recorded with Middlesex Registry of Deeds, Southern District, in Book 11790, Page 101.

Said premises are referred to as Tract No. 10 on a plan entitled, "Real Estate Tract Map, National Aeronautics and Space Administration, Electronics Research Center, Cambridge, Massachusetts," dated April 12, 1966, and revised April 29, 1966, May 4, 1966, May 24, 1966 and May 31, 1966 and recorded with Middlesex Registry of Deeds, South District as Plan No. 715 of 1966 in Book 11137, Page 315.

The Grantee covenants and agrees, for itself and its assigns, that the Grantee and such assigns shall:

(a) devote the granted premises to, and only to and in accordance with, the uses specified in the Urban Renewal Plan of Cambridge Redevelopment Authority for the Kendall Square Urban Renewal Project, Project No.

BK13011 PG260

R-107, in the City of Cambridge, Massachusetts, a copy of which has been filed in the office of the City Clerk of the City of Cambridge (said Plan being hereinafter referred to as the "Urban Renewal Plan"), as the same may be amended from time to time; and

(b) not discriminate upon the basis of race, color, religion, sex or national origin in the sale, lease, or rental, or in the use or occupancy of the granted premises, or any improvements erected or to be erected thereon, or any part thereof.

The covenants and agreements provided in the preceding paragraph shall be covenants running with the land and they shall, in any event, and without regard to technical classification or designation, legal or otherwise, and except only as otherwise specifically provided herein, be, to the fullest extent permitted by law and equity, binding for the benefit and in favor of, and enforceable by, the Grantor, its successors and assigns, the City of Cambridge, and the United States of America (in the case of the covenant and agreement provided in clause (b) of the preceding paragraph) against the Grantee and every successor in interest to the granted premises or any part thereof or any interest therein, and any party in possession or occupancy of the granted premises or any part thereof, provided, however, that the covenants and agreements provided in clause (a) of said preceding paragraph shall remain in effect until October 7, 1995 (at which time such covenants and agreements shall terminate) and those provided in clause (b) shall remain in effect until October 7, 2065. In amplification, and not in restriction, of the foregoing provisions, it is intended and agreed that the Grantor, its successors and assigns, and the City of Cambridge, shall each be deemed a beneficiary of the covenants and agreements provided in the preceding paragraph, and the United States of America shall be deemed a beneficiary of the covenant and agreement provided in clause (b), both for and in their or its own right and also for the purpose of protecting the interests of the community and any other parties, public or private, in whose favor or for whose benefit such covenants and agreements have been provided. Such covenants and agreements shall run in favor of the Grantor, its successors and assigns, the City of Cambridge, and the United States of America, for the entire period during which such covenants and agreements shall be in force and effect, without regard to whether the Grantor, its successors and assigns, or the City of Cambridge or the United States of America has been, is or remains the owner of any land or interest therein to, or in favor of, which such covenants and agreements relate. The Grantor, its successors and assigns (or, in the case of its failure, refusal or dissolution, then the City of Cambridge), shall have the right, in the event of any breach of any such covenant or agreement, and the United States of America shall have the right in the event of any breach of the covenant or agreement provided in clause (b) of the preceding paragraph, to exercise all the rights and remedies, and to maintain any actions at law or suits in equity or other proper proceedings to enforce the curing of such breach of covenant or agreement, to which it or any other beneficiaries of such covenant or agreement may be entitled.

It is understood and agreed that: (a) the granted premises shall be used by the Grantee for governmental purposes in accordance with the Urban Renewal Plan, as the same may be amended from time to time, and with the provisions of 42 U.S.C. 1455(b), and (b) upon the termination by the Grantee of

BK 13011 PG 261

the use of the granted premises as aforesaid, any subsequent resale thereof by the Grantee may be on terms no more restrictive than any other conveyances made pursuant to the Urban Renewal Plan.

This conveyance is made subject also to the additional agreements of the Grantee with respect to the granted premises and the terms and conditions set forth in a Land Disposition Contract, dated June 13, 1966, between the Grantor and the Grantee for the sale and redevelopment of the granted premises, recorded in the Middlesex South District Registry of Deeds, Book 11137, Page 315, and filed as Document No. 433534 in the Land Registration Office of said District as supplemented from time to time.

The address of the Grantee is:

General Services Administration
Region 1
John W. McCormack
Post Office and Courthouse
Boston, Massachusetts 02109

This conveyance is free of and without any right on the part of the Grantor of reentry or reverter for condition broken.

WITNESS the execution hereof under seal this 7th day of July, 1976.



CAMBRIDGE REDEVELOPMENT AUTHORITY

By

Robert F. Rowland

Executive Director and Secretary

Thomas J. Murphy

Chairman

(SEAL)

UNITED STATES OF AMERICA
acting by and through
GENERAL SERVICES ADMINISTRATION

By

Robert L. Pedersen

COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss.

July 7, 1976

Then personally appeared the above-named Thomas J. Murphy and acknowledged the foregoing instrument to be the free act and deed of Cambridge Redevelopment Authority, before me,

Robert L. Pedersen
Notary Public

My Commission Expires



CORPS OF ENGINEERS

185 0125

U.S. ARMY

The original of this map is at a scale of 1" = 50 feet and is on file at the Department of the Army, New England Division, Corps of Engineers, 12th Tropical Road, Waltham, Mass. 02154. Scale of this map 1" = 150 feet.

Map has been compiled from deeds on record, surveys by others and computations.

TRACT AREA	SQUARE FEET
TRACT NO.	
1A	10,000
1B	10,000
1C	10,000
1D	10,000
1E	10,000
1F	10,000
1G	10,000
1H	10,000
1I	10,000
1J	10,000
1K	10,000
1L	10,000
1M	10,000
1N	10,000
1O	10,000
1P	10,000
1Q	10,000
1R	10,000
1S	10,000
1T	10,000
1U	10,000
1V	10,000
1W	10,000
1X	10,000
1Y	10,000
1Z	10,000
TOTAL AREA	1,000,000

RESERVED STRIPS	SQUARE FEET
TRACT NO.	
1A	10,000
1B	10,000
1C	10,000
1D	10,000
1E	10,000
1F	10,000
1G	10,000
1H	10,000
1I	10,000
1J	10,000
1K	10,000
1L	10,000
1M	10,000
1N	10,000
1O	10,000
1P	10,000
1Q	10,000
1R	10,000
1S	10,000
1T	10,000
1U	10,000
1V	10,000
1W	10,000
1X	10,000
1Y	10,000
1Z	10,000
TOTAL AREA	1,000,000

1005.00
SW

Midwest Registry of Deeds, St. Paul,
Minnesota
File No. 115
Book 115
Page 315

PLAT 115
BOOK 115
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PROJECT MAP

LOCATION OF PROJECT

TRANSPORTATION FACILITIES

ACQUISITION

REMARKS

LEGEND

TRACT MAP

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ELECTRONICS RESEARCH CENTER
CAMBRIDGE, MASSACHUSETTS

DATE: 11/15/66
BY: [Signature]
CHECKED BY: [Signature]
APPROVED BY: [Signature]

EXHIBIT B

Plan showing boundaries of the area subject to the AUL in relation to the boundaries of the disposal site.



EXHIBIT C

ACTIVITY AND USE LIMITATION OPINION

In accordance with the requirements of 310 CMR 40.1074, this Activity and Use Limitation Opinion has been prepared for the property located at 55 Broadway, Cambridge, Massachusetts. As of the date of the recording of the Notice of Activity and Use Limitation ("Notice") with the Middlesex County Registry of Deeds, the subject property is zoned for local business use. The disposal site is located at 55 Broadway in a commercial area of Cambridge. The property contains one multi-story office building and three other buildings owned and occupied by the U.S. Department of Transportation (DOT) Volpe National Transportation Systems Center (Volpe Center). The U.S.DOT/Volpe Center property also contains parking lots, landscaped areas and open grass lawns. The U.S.DOT/Volpe Center complex is approximately 15 acres in size. The parking lot on the east side of the property has gated access from the property front on Broadway and also from the rear on Potter Street.

The environmental investigation at the property centered about the TSC Child Care Center playground, located just east of and adjacent to, the gated driveway that enters the property from Potter Street. The TSC Child Care Center is located in Building #4, just west of and adjacent to, the gated driveway from Potter Street. The TSC Child Care Center playground is located in the northwestern portion of a large open grass field. The playground is surrounded by a four foot high chain link fence with locking gates. A chain link fence also bisects the playground, separating the Preschool Playground to the north from the Toddler Playground to the south. The majority of the Preschool Playground is covered by a chipped rubber surface; the remaining (northern) portion is landscaped. A portion of the Toddler playground is covered by a rubber play mat, a portion by a gazebo, and the remainder is grass.

The areas of the U.S. DOT/Volpe Center complex that were the subject of environmental investigations, including the playground, grass field, and areas near Building #4, are all located within the two parcels of land identified as Tract 2B and Tract 10. These two parcels comprise approximately 5 acres of land within the U.S.DOT/Volpe Center complex. A legal metes and bounds description of the property is provided as Exhibit A.

Site History

On July 18, 2006 what appeared to be coal tar was discovered by workers excavating post holes for new playground equipment. The MassDEP was notified on July 18, 2006 and RTN 3-26067 was assigned to the site. An Imminent Hazard (IH) evaluation was performed by Lord Associates, Inc. and no IH condition was determined to exist. MassDEP gave verbal authorization for an Immediate Response Action (IRA) and approximately 171 tons of contaminated soil was subsequently excavated from the Preschool Playground on August 15 and 16, 2006. Soil was removed to a depth of approximately 5 feet, the excavated area was backfilled with clean fill, and the playground was reconstructed. The soil was transported offsite

on August 28, 2006 under Bill of Lading to a thermal processing plant. The IRA Completion Report of October 2006 indicated that some soil impacted by residual polycyclic aromatic hydrocarbons (PAHs) remained beyond the horizontal and vertical limits of excavation. The IRA Completion Report concluded that the coal tar was related to the former Cambridge Gas Light Company's manufactured gas plant, located north of the Site across Potter Street. Coal tar, a by-product of the MGP process, was reportedly piped to barges in the Broad Canal - the canal that formerly bisected the Volpe Center property parallel to Potter Street and Broadway. Coal tar had been discovered in the shallow soil at several sites in the immediate area, including the discovery in 2005 by workers installing a new gas main in Potter Street.

A Phase I investigation was completed by FS Engineers, Inc. (FSE) in May 2007 as a follow-up to the IRA Completion Report. The Phase I included the advancement of eleven soil borings within, and directly adjacent to, the fenced-in playground. Three of the borings were completed as groundwater monitoring wells. The Phase I soil sampling revealed arsenic and lead, in addition to the PAHs attributed to the coal tar, at levels above the applicable Method 1 soil standards in selected soil samples. No groundwater sample collected from the site was found to have any contaminant of concern (COC) at a level above the applicable Method 1 groundwater standard. A Phase I Initial Site Investigation Report and Tier Classification were submitted to the MassDEP on July 18, 2007. Supplemental soil sampling activities were conducted in April 2008 that included the advancement of fourteen shallow soil borings to evaluate the extent of the contaminated media within the shallow soil of the grass field adjacent to the playground. Levels of PAHs were detected at levels above the applicable Method 1 soil standards in two of the fourteen samples.

A Remedial Action Measure (RAM) Plan was developed in September 2008 for the removal of soil from within the Toddler Playground. RAM activities were completed in October 2008 which included the excavation of the top 4 feet of soil from the Toddler Playground and the off-site disposal of approximately 237 tons of soil from the site. PAHs and/or lead were detected at concentrations above the applicable Method 1 soil standards in several of the confirmatory soil samples. A RAM Completion Statement and Response Action Outcome (RAO) Report was filed in January 30, 2009. Due to the residual contaminated soil at depth, an AUL for a portion of the site was included as part of the RAO. The MassDEP performed an audit of the site in August 2010 and determined that additional information was necessary in support of the RAO and AUL as outlined in the Notice of Audit Findings (NOAF) dated October 13, 2010.

Supplemental soil sampling, groundwater monitoring well installation, and groundwater sampling were conducted at the site following the NOAF. In March 2011 fourteen soil borings were advanced and six groundwater monitoring wells were installed at the site. Although no coal tar was observed in any boring, fill materials including coal ash and coal slag were observed in nearly every boring at depths below 6 inches from grade surface. Soil samples were collected for laboratory analysis of volatile organic compounds (VOCs), extractable petroleum hydrocarbons (EPH) with PAHs, and metals. Laboratory analytical results found that PAHs and/or lead were detected at concentrations above the applicable Method 1 soil standards in several samples. Two soil samples collected from 0 to 3 feet deep in the landscaped portion of

the Preschool Playground showed concentrations of two PAH compounds just above the applicable Method 1 soil standards. No groundwater sample collected from the site was found to have any COC at a level above the applicable Method 1 groundwater standard.

A RAM Plan was developed in April 2011 for the removal of soil from the landscaped portion of the Preschool Playground. On April 25 and 26, 2011 the top 3 feet of soil was excavated from the northern portion of the Preschool Playground. This area had not been previously excavated during the IRA activities of 2006. Although no layer of coal tar was found during the excavation of April 2011, areas of fill material with coal slag, coal ash, and brick were observed in the subsurface soils. The excavated area was backfilled with clean fill and the area was re-landscaped. The soil was transported offsite on May 9, 2011 under Bill of Lading to an approved landfill.

An area of subsurface coal tar was initially discovered within the limits of the playground in 2006. Following the excavation and removal of coal tar from the Preschool Playground in 2006 and the excavation and removal of coal tar from the Toddler Playground in 2008, none of the soil borings advanced at the site showed any significant evidence of the presence of coal tar. However, isolated pockets of coal tar may be present at depth in the subsurface. Historic fill containing coal ash, slag, and other debris (mainly brick) was observed throughout subsurface site soils during the environmental investigations. Laboratory analysis of soil samples throughout the property revealed the presence of EPH, PAHs, lead and other compounds associated with historic fill. The vertical extent of historic fill across the majority of the Site appears to be approximately 8 feet in depth overlying natural deposits. The filled area appears to extend horizontally to the limits of the property. Exhibit B attached hereto indicates the location of the disposal site relative to the subject property.

Reason for Activity and Use Limitation

Based on a Method 3 Risk Characterization, the site poses No Significant Risk for activities and uses consistent with its current use as a commercial office complex including open landscaped areas and a daycare center playground. However, a risk was found to exist associated with the use of the site as a residence. Soil impacted by higher than background levels of EPH, PAHs, and metals associated with the historic fill are found at depths below 6 inches from surface grade throughout the site with the exception of the fenced-in TSC Child Care Center Playground. Accessible soil from surface grade to a depth of 3 feet below grade has been removed from within the playground during IRA and RAM activities of 2006, 2008, and 2011.

In order to ensure that a level of No Significant Risk is maintained at the Site, an AUL is necessary to prohibit future use of the property as a residence. The AUL area for this Site is depicted as Tract 2B and Tract 10 on a plan recorded in the Middlesex Registry of Deeds in Plan Book 11137, Plan 715. The legal deeds for Tract 2B and Tract 10 are located at the Middlesex Registry of Deeds in Book 11152, Page 461 and Book 13011, Page 258, respectively. The AUL is based upon the assumptions and restrictions of the Risk Characterization regarding future site activities and uses.

The contaminated fill is currently located at depths greater than 6 inches below surface grade in the area identified on Exhibit B. The designated AUL area is considered accessible from 0 to 3 feet deep, and potentially accessible from 3 to 15 feet deep.

Permitted Activities and Uses

- (i) Site activities and uses including, but not necessarily limited to, recreational activities in the playground and the surrounding field, pedestrian traffic, and/or vehicular traffic which do not cause and/or result in the disturbance of contaminated soil located at depths greater than 6 inches below surface grade;
- (ii) Excavation associated with short-term (three months or less) landscaping activities, underground trenching activities, and/or construction activities by adult workers which are likely to disturb contaminated soil located at depths up to 3 feet below surface grade;
- (iii) Excavation associated with short-term (three months or less) underground utility and/or construction which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade, provided that such activities are conducted in accordance with a Soil Management Plan and a Health and Safety Plan prepared and implemented in accordance with Obligations (i) and (ii) of this AUL Opinion prior to the commencement of such activity;
- (iv) Activities and uses which are not identified by this Opinion as being inconsistent with maintaining a condition of no Significant Risk; and
- (v) Such other activities or uses which, in the Opinion of an LSP, shall present no greater risk of harm to health, safety, public welfare or the environment than the activities and uses set forth in this Paragraph.

Prohibited or Limited Site Activities and Uses

- (i) Any short term (3 months or less) activity including, but not limited to, excavation which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade without the prior development of and implementation of a Soil Management Plan and a Health and Safety Plan in accordance with Obligations (i) and (ii) below;
- (ii) Any long term (greater than 3 months) activity which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade;
- (iii) Relocation of contaminated soil currently located at depths greater than 3 feet below surface grade to a shallower depth, unless such activity is first evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk;

- (iv) Relocation of contaminated soil currently located between 6 inches and 3 feet below surface grade to a shallower depth, unless such activity is first evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk;
- (v) Use of the property as a residence; and
- (vi) Construction of any building at the site which does not meet the assumptions of the vapor intrusion model and risk characterization used to support the Response Action Outcome for the site without prior evaluation by a LSP who renders an Opinion which states that the use of such building is consistent with maintaining a condition of No Significant Risk.

Obligations and Conditions Set Forth in the AUL Opinion

- (i) A Soil Management Plan must be developed by an LSP and implemented prior to the commencement of any activity which is likely to disturb contaminated soil located at depths greater than 3 feet below surface grade within the AUL Area. The Soil Management Plan must be prepared in accordance with the guidelines discussed in the Activity and Use Limitation;
- (ii) A Health and Safety Plan must be developed and implemented prior to the commencement of any activity which is likely to disturb the contaminated soil located at depths greater than 3 feet below surface grade within the AUL Area. The Health and Safety Plan must be prepared by a qualified individual sufficiently trained in worker health and safety protocols. Workers who may come in contact with the coal tar contaminated soil within the designated AUL area must be informed of its location and the specific personal protection and monitoring requirements of the Health and Safety plan necessary to prevent exposures via dermal contact, ingestion, and/or inhalation of particulates. The Health and Safety Plan must remain available on-site throughout the course of the project;
- (iii) The contaminated soil located at depths greater than 3 feet below surface grade within the AUL Area must remain at depth and may not be relocated, unless such activity is first appropriately evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk;
- (iv) The contaminated soil located at depths between 6 inches and 3 feet below surface grade within the AUL Area must remain at these depths and may not be relocated, unless such activity is first appropriately evaluated by an LSP who renders an Opinion which states that such relocation is consistent with maintaining a condition of No Significant Risk. A 6-inch layer of loam at surface grade will always be maintained within the unpaved areas;
- (v) Specifications for future buildings to be constructed at the site must be compared to the assumptions of the vapor intrusion model and risk characterization used to support the Response Action Outcome for the site and re-evaluated by an LSP who must render an

Opinion as to whether site conditions, activities, and/or uses associated with the future building potentially pose a significant risk of harm to human health; and

- (vi) Response actions must be conducted in accordance with the Massachusetts Contingency Plan, 310 CMR 40.0000, should an LSP Opinion rendered pursuant to Obligation (i) conclude that future site uses and activities, including exposures associated with future building construction, are inconsistent with maintaining a condition of No Significant Risk.

LSP Name: M. Farooq Siddique, P.E. LSP # 9845

LSP Seal:

Signature:

M. F. Siddique

Date:

5/13/2011

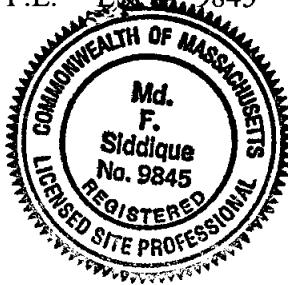
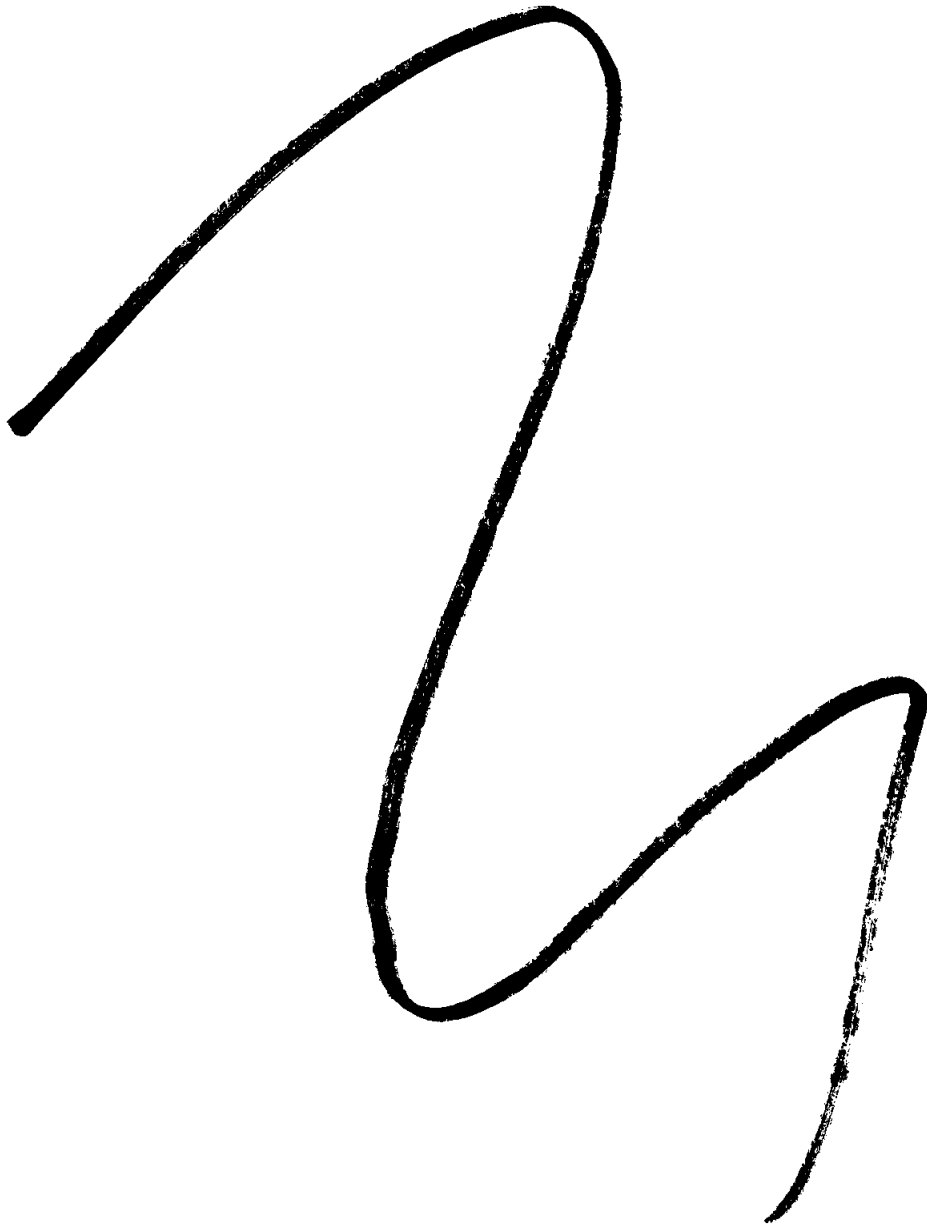


EXHIBIT D

Activity and Use Limitation Opinion Form BWSC-113A

A large, bold, handwritten signature in black ink, consisting of a series of sweeping, connected strokes that form a stylized, abstract shape.



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113A

ACTIVITY & USE LIMITATION (AUL) OPINION FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number

3

- 26067

A. DISPOSAL SITE LOCATION:

1. Disposal Site Name: **VOLPE TRANSPORTATION CENTER**

2. Street Address: **55 BROADWAY**

3. City/Town: **CAMBRIDGE**

4. ZIP Code: **02142-0000**

B. THIS FORM IS BEING USED TO: (check one)

- ☒ 1. Provide the LSP Opinion for a **Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1074.
- ☐ 2. Provide the LSP Opinion for an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement**, pursuant to 310 CMR 40.1080. Include BWSC113A as an attachment to BWSC113. Section A and C do not need to be completed.
- ☐ 3. Provide the LSP Opinion for an **Amended Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1081(4).
- ☐ 4. Provide the LSP Opinion for a **Partial Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(3).
- ☐ 5. Provide the LSP Opinion for a **Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(1)(d).
- ☐ 6. Provide the LSP Opinion for a **Grant of Environmental Restriction**, pursuant to 310 CMR 40.1071.
- ☐ 7. Provide the LSP Opinion for an **Amendment of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1081(3).
- ☐ 8. Provide the LSP Opinion for a **Partial Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(2).
- ☐ 9. Provide the LSP Opinion for a **Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(1)(c).
- ☐ 10. Provide the LSP Opinion for a **Confirmatory Activity and Use Limitation**, pursuant to 310 CMR 40.1085(4).

(Unless otherwise noted above, all sections of this form (BWSC113A) must be completely filled out, printed, stamped, signed with black ink and attached as an exhibit to the AUL Document to be recorded and/or registered with the Registry of Deeds and/or Land Registration Office.)

C. AUL INFORMATION:

1. Is the address of the property subject to AUL different from the disposal site address listed above?

☒ a. No ☐ b. Yes If yes, then fill out address section below.

2. Street Address:

3. City/Town:

4. ZIP Code:



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113A

ACTIVITY & USE LIMITATION (AUL) OPINION FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number

3 - 26067

D. LSP SIGNATURE AND STAMP:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and 309 CMR 4.03(2), and (iii) the provisions of 309 CMR 4.03(3), to the best of my knowledge, information and belief,

> if Section B indicates that a **Notice of Activity and Use Limitation** is being registered and/or recorded, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1074;

> if Section B indicates that an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement** is being submitted, this evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1080;

> if Section B indicates that an **Amended Notice of Activity and Use Limitation or Amendment to a Grant of Environmental Restriction** is being registered and/or recorded, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 40.1081;

> if Section B indicates that a **Termination or a Partial Termination of a Notice of Activity and Use Limitation, or a Release or Partial Release of a Grant of Environmental Restriction** is being registered and/or recorded, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1083;

> if Section B indicates that a **Grant of Environmental Restriction** is being registered and/or recorded, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1071;

> if Section B indicates that a **Confirmatory Activity and Use Limitation** is being registered and/or recorded, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1085(4);

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

1. LSP #: 9845

2. First Name: FAROOQ M

3. Last Name: SIDDIQUE

4. Telephone: (978) 298-5956

5. Ext.:

6. FAX: (978) 298-5104

7. Signature: 

8. Date: 5/13/2011

mm/dd/yyyy

9. LSP Stamp:

